

VOL. XXXV. No. 5

MAY 1950

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MAGAZINE

Editorial Offices:
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With the Editor

Vanished Irish Railways

The closing of much of the Belfast and County Down Railway referred to on page 201 of this issue, together with the suspension of services on the Giant's Causeway electric line that was recorded last month, cannot fail to strike a note of sadness for the railway observer.

Some of these vanished Irish railways had features of outstanding interest, quite peculiar to themselves. There was for instance the Listowel and Ballybunion line, closed in 1924. On this the track was a kind of continuous trestle, the upper member of which, supported on legs framed up like the letter A, formed the running rail and carried the load. Additional rails, one on each side by the cross member of the A-frame, were provided for guiding purposes. The engines and stock were arranged in pairs on each side of the central wheels. With this scheme balance obviously presented a problem, and we recall a story quoted by the late Mr. G. A. Sekon in an article in *"The Railway Magazine"* of November 1924: "It was one day required to send a cow from one end of the line to the other. Its conveyance raised the question of balancing, and accordingly another cow was borrowed to form a balancing load. On arriving at destination, the problem was how to return the borrowed animal. Two calves were obtained, and these together provided a balance for the cow to be returned. When the latter had arrived home it was an easy question to return the calves one on each side."

Then there was the Dublin and Blessington steam tramway. This was the longest roadside steam tramway in the British Isles and was the last of its type to remain in operation. It was a quaint survival that managed to exist until 1932. Here were

found not only tramway type vehicles of the semi-open top variety, with outside stairs and garden seats on the top deck, but also an amusing collection of engines. Some of these were of the boxed-in tramway type, others were of more normal aspect except for the unusual provision of an additional cab at the smoke-box end. To add to the gaiety, advertisements seem to have been displayed on the car bodies and even on some of the engines. The unusual appearance of the trains was completed by the specially tall chimneys of the engines which were carried up to an astonishing height in order that the exhaust with its plentiful smoke and cinders might be carried above the car roofs.

The loss of these friendly little lines is one of the penalties of progress.

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This "Box-kite," of 1910, was the first aircraft to go into production at Filton. The illustrations to this article are by courtesy of The Bristol Aeroplane Co. Ltd., Filton.

"Box Kite" to "Brabazon"

By John W. R. Taylor

THE Bristol Aeroplane Company, which recently celebrated its 40th birthday, was not quite the first British aircraft firm, but once in business it soon made itself the most important one.

Its founder, Sir George White, was first and foremost a businessman, and he ran his British and Colonial Aeroplane Company as a "go-ahead" commercial concern from the start. His first machines were based on the best available foreign designs, with the object of producing aircraft that would not only fly but sell, at a time when most of his competitors were overjoyed if their products managed to leave the ground at all!

His wisdom and optimism certainly produced results. Within seven months a "Box-kite" biplane built by his firm became the first aircraft ever to fly at the British Army Manœuvres on Salisbury Plain. A few days later the first air-to-ground radio signals were successfully transmitted from another "Box-kite" in the same area. These demonstrations so impressed the War Minister, Mr. Haldane, that he increased the next Army Estimate appropriation for air services from £9,000 to £50,000.

By the end of 1910 the company had built the remarkable total (for those days) of 16 aeroplanes. But even this was not good enough for Sir George, who sent private "air missions" to India and Australia, with the result that within a couple of months his "Box-kites" had completed the first cross-country flights ever made in those regions, achieving such

world-wide publicity in the process that the company received the first Government contract ever awarded to a British firm—an order for eight "Box-kites" for Russia!

Not to be outdone, the British Government ordered four of the rather more powerful "Bristol Military Biplanes" in March 1911, to form the nucleus of its first Air Battalion.

Meanwhile, the capital of the company had been increased to £250,000, which enabled it to call on the services of such eminent designers as Mr. Gordon England and M. Henri Coanda, the Roumanian. Both produced machines for the British Military Trials of 1912, the two Coanda monoplanes gaining second and third places in the competition.

Unfortunately a series of accidents to monoplanes led to a rather over-cautious Government ban on this type of aircraft, just as they were beginning to establish their superiority over biplanes. As the ban did not apply to overseas sales, the British and Colonial Aeroplane Company were able to sell monoplanes to foreign countries, while supplying biplanes to the British Government. One of these monoplanes achieved the distinction in September 1912 of being the first aircraft ever used on active service, when the Bulgarian Army employed it in the Balkan War.

The "History of British Aviation" leaves little doubt of the company's status at this time, remarking that "British aviation was regarded with contempt and ridicule

in France, and the "Bristol" Company alone upheld British prestige abroad. Their reliable old Box-kite and spritely monoplanes were flown all over Europe and in India, the Far East and the Antipodes. They gained a reputation for sound workmanship which did much to counteract the overpowering influence of the French."

Progress was rapid in the next two years, and by the time war broke out in 1914 over 260 aircraft had been built at Filton, many of them going abroad to Italy, Bulgaria, Germany, Roumania, Russia, Spain and Turkey. Furthermore 80 per cent. of the British military pilots then available for service had graduated from the company's flying school at Larkhill on Salisbury Plain.

The outbreak of war meant that for the present the company had to put aside its monoplanes and build instead other people's biplanes to meet urgent military requirements. Paradoxically, while this was happening, aircraft of "Bristol" design were being built under licence in Italy by the Caproni Company and in



The "Braemar" heavy bomber, a Bristol type produced in 1918. It achieved a top speed of 106 m.p.h.

"Bullet" scout of 1914, one of the earliest British single-seat fighters, which he followed up with the famous old "Bristol Fighter," completely revolutionising current ideas on what could be achieved with two-seaters. More than 3,500 "Brisfits," as they were affectionately known, were built during and after that war, in which they probably saw more service than any other type. In doing so, they firmly established the "Bristol" company as one of the greatest aircraft concerns in the world. Unfortunately, Sir George White did not live to see them.

Of the other "Bristol" types designed during World War I, the most interesting were the M.R.I. two-seat reconnaissance biplane of 1917, which was the first all-metal aeroplane to fly in this country, and the Type 20 fighter, which marked the company's return to its old love, the monoplane. It was naturally turned down for service on the Western Front, as the Air Ministry was still allergic to monoplanes, and so an aircraft that

would have given Allied pilots a tactical advantage over their opponents was relegated to service in Palestine, Mesopotamia (now Iraq) and Macedonia.

But the Armistice the Germans would probably have made the unpleasant acquaintance of an even more formidable product of Filton, for the "Braemar"



The famous Bristol "Bulldog," 1927-33. It became the standard day-and-night fighter in the R.A.F.

France by Breguet.

Meanwhile the design office was flourishing under the guidance of Frank Barnwell, whose genius did much to keep the company in the forefront of world progress until he was killed in a futile accident in 1938.

His first important design was the little



Bristol "Blenheim," 1936-42, founder of the whole line of Bristol wartime aircraft.

four-engined triplane was being prepared at that time for long-range bombing of Berlin. Instead, it was modified into the "Pullman," a 14-seat luxury air liner, the company's first contribution to post-war civil flying. Simultaneously several "Bristol Fighters" were converted into 2-3 seat touring aircraft, one of which was named romantically "Honeymoon Express."

On 31st December 1919 the company's name was changed officially to The Bristol Aeroplane Company, a logical step, as its products had always been referred to as "Bristol" types. Shortly afterwards, an even more important development was the acquisition of the Cosmos Engineering Company, whose air-cooled radial "Jupiter" engine and the later "Lucifer" laid the foundation of the Bristol engine division, which has shared the honours for the success of most subsequent Bristol aircraft.

During this period Bristol built many interesting experimental aircraft, including the "Traump," which had four engines completely enclosed in its fuselage; the "Brandon," one of the first specialised air ambulances; and the little streamlined "Racer," a 20 ft. span cantilever monoplane with retractable undercarriage, whose smooth lines belied its handling characteristics. Among other things, the wings had a habit of flexing in flight, which did not enhance its popularity.

Although military contracts were few and small, Service aircraft continued to be the mainstay of the company's success. Many famous types were produced in the 1920's, culminating in the "Bulldog," which in 1929 became the R.A.F.'s standard fighter. Nearly 500 were built for home and foreign Governments, and some were still in service in Finland in 1938-9, when they helped successfully to defend that country against attacking Russian bombers.

The "Bulldog" was powered by a "Jupiter," from which had been developed in 1928 an even more successful Bristol engine, the "Mercury." Then in 1932 came the "Pegasus," first of the nine Bristol seven-valve engines designed by Mr. Ivor Sir Roy Fedden, and the "Pegasus," which four times in the next five years powered aircraft which broke the World's Height Record. In 1936, for example, the special "Pegasus"-powered Bristol 198A High-Altitude research monoplane reached a height of 49,967 ft. Next year, the same type raised the record to 53,917 ft., piloted by Flt. Lt. M. J. Adam, who hooked like a cross between a diver and a "man from Mars" in his pressure-suit and sealed helmet.

The "Pegasus" was not a freak high-altitude engine, however, and among other things it was chosen to power the magnificent Short "Empire" flying boats, thus carrying on the great tradition of airline service established earlier by the "Jupiter." The "Pegasus" was also fitted to the four Vickers "Wellesley" aircraft which broke the World's Long-Distance Record in 1938, and in the Fairey "Swordfish" torpedo-bomber, hero of scores of outstanding wartime actions.

For some time prior to this it had been obvious that Bristol's early faith in the monoplane was justified, and that the biplane was on the way out; and the company was one of the first to seize the opportunity of higher performance which the monoplane layout offered, in conjunction with new stressed-skin methods of construction. Two interesting prototypes resulted in 1935. One was the Type 135, first of a new generation of all-metal fighters with retractable undercarriages, which might well have gone into quantity production had not the firm been too busy building other types.

The second new prototype was the Type 142 "Briston First" with two "Mercury" engines, construction of which had been sponsored by the late Lord Rothermere. Intended originally as a high-speed civil transport, it startled the R.A.F. by reaching a speed of 282 m.p.h.—far above that of the fastest fighter of the day. Characteristically Lord Rothermere presented the 142 to the nation, and from it was developed the famous "Blenheim" medium bomber, first aircraft to go into action in World War II, when formations of this type attacked German warships at Wilhelmshaven and Brunsbüttel.

The "Blenheim" was produced in large numbers, both in Britain and Canada, and became the only aircraft to serve in every Command of the R.A.F. The "Bombay," a high-wing monoplane which first appeared in 1934, did excellent work in the Middle East and Africa as bomber and transport, and in 1940 these two types. (Continued on page 215)



The Bristol "Beaufighter," 1940-45, a fine type that "won its spurs" in the night battles over Britain in 1940-41.

More Unusual Models

By W. J. Bassett-Lowke, M.I.Loco.E., F.R.S.A.

AMONG the many models increasingly in demand for industrial purposes nowadays are various types of working models. Recently a very large model was constructed for Metal Containers Ltd. of their Ellesmere Port drum-making factory, by Bassett-

Lowke. So realistic are the model machines, etc., that when regarded at eye level the model might be the real thing. For example, after the drums pass through the testing tanks they are put on a conveyor to be passed through a drying chamber, over gas jets.

To give this effect in the model, artificial flickering lights are shown inside the drying chamber, giving the appearance of jet flames. Underneath the model, below the base, is a mass of mechanism, with complicated and intricate devices for the electrical working of all the machines, etc.

In addition, the realism is increased by scale model figures of men working in various positions throughout the factory.

The road approaches in the factory are shown with vans and lorries, and at one end there is a model railway track with locomotives and wagons.

Most M.I.L.E. models are similar with the model type of bucket dredger, which is frequently seen at work in shallow waterways and harbours, clearing channels for watercraft. The accompanying photograph shows a model of a more up-to-date type, the suction dredger.

This model was built in the order of Messrs. and The Ltd. of Kenilworth, Scotland, who built the prototype for the Mexican Government. Built for the

specific purpose of dredging, this vessel is a single-tube sand suction dredger and rather curious in appearance. The forward part of the hull is in two sections, with a tunnel running fore and aft, in which the suction tube is housed. The tube can be lowered to the sea or river bed and is controlled from the bridge. Silt is drawn through the tube and deposited into the hopper. Aft of the hopper is the deckhouse over the engine room in which are recuperating engines for propulsion. The model is built to a scale of $\frac{1}{2}$ in. to 1 ft.



Central portion of the model drum-making factory, with the roof cut away to reveal some of the machines in operation.

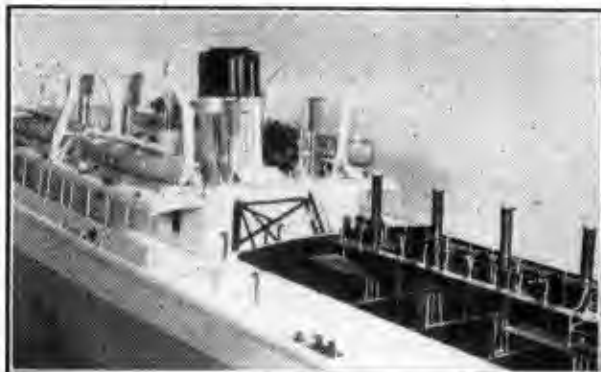
Lowke Ltd., at Northampton.

This model is to a scale of $\frac{1}{2}$ in. to 1 ft., or 1/32nd actual size, the whole measuring approximately 13 ft. by 4 ft. The main purpose of the model is to show in detail the entire process of the manufacture of steel drums, from the reception of raw material to the finished product, and to indicate the rail and road transport approaches that serve the factory.

As the model contains the whole factory and at the same time shows all the internal machinery,

the part of the roof and walls of the model were cut away; they were left intact and complete with steel ribbing at each end of the model, but were removed from the centre portion to give an uninterrupted view of the interior.

The most fascinating part about the model is the working of the manufacture machinery. This commences with a model of a Morris mobile crane unloading sheets of steel from lorries and stacking them in the storage shed. The variety of working model machines include presses, guillotines, a seam welder, a brushing machine, flanging machines and a corrugator. Then follow four testing tanks, a gas drying chamber, a spray painting booth and an oil-bath drying oven through which all drums have to pass after painting. Lastly there is a Monorail conveyor, which carries the finished drums to the rail and road transport.



A photograph of the model of the "Campeche," a single-tube sand suction dredger, taken amidships.

Ludwig Koch and his Sound Recordings

By Trevor Holloway

FEW broadcasters have a more appreciative listening public than Ludwig Koch, whose recordings of bird song have become one of the most popular features of B.B.C. programmes. Dr. Koch has succeeded in bringing the very spirit of the Great Outdoors to our firesides, and even those who live in the country have been enabled to hear the voices of many creatures hitherto unfamiliar to them.

Apart from the distinction of being the first person to record bird song out of doors, this popular broadcaster has had a most interesting and successful career. At one time he was responsible for publicity, propaganda and exhibition at the historic city of Frankfurt-on-Main. He created and organised the International Music Exhibition, "Music in the Life of Nations," in 1927, and shortly afterwards was appointed director of the Cultur Department of the German Gramophone, Odeon and Parlophone Company. Dr. Koch was the originator of sound books, that is books with records as an inseparable part, and he is an authority on the synchronisation of Nature films.

He began his investigations into sound recordings at the tender age of eight! One day, about 60 years ago, Ludwig's father presented him with a toy recording machine and half a dozen wax cylinders. His first conquest was the voice of a cage bird at his home, a record which is still one of his most treasured possessions.

As time went on he recorded the voices of many famous people. One of the pioneers of the German gramophone industry presented him with an acoustic recorder, the last word in recording gear at that time, and he began to tackle more ambitious work. By 1914 he had succeeded in recording the song of the blackbird in the open air, using a thin steel disc coated with enamel for the purpose. The quality of these early recordings was far from

perfect, and it was not until 1926, when technical gear, including a microphone, became available, that he was able to obtain the high standard he desired. He acquired mobile gear, and a lady enthusiast who at the time was President of the Society for the Protection of Birds made him a present of a huge car in which to transport his equipment around the countryside.

For the next 10 years most of his recordings were made on the Continent, but in 1936 he left Germany to make his home in Britain. His fame as a sound recorder and naturalist was already well known in this country, so it is not sur-



The voices of baby seals in caves on the shore are picked up by a microphone and recorded at the top of the cliff by Dr. Ludwig Koch. Photograph, Paul Popper Ltd.

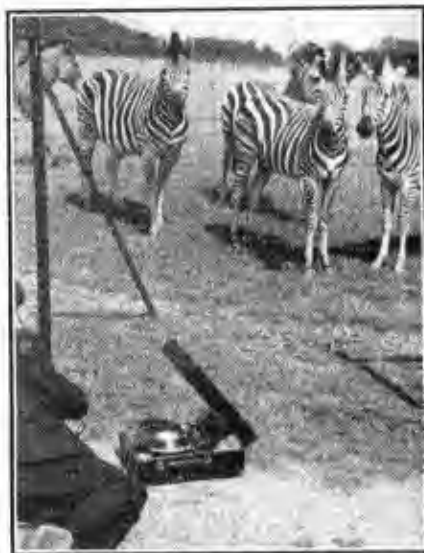
prising to know that within a week of his arrival the B.B.C. was seeking permission to broadcast his records. Dr. Koch, however, suggested that it would be better to wait until he could give listeners the songs of British birds, and, encouraged by Johan Huxley, he began the brilliant work which has been going on ever since.

His first few efforts in the spring of 1936 gave him some idea of the difficulties ahead, for he had a taste of our capricious weather. To use his own words: "Never before had I the weather of four seasons within a day or even within hours; wind, rain, hail and the rustling of leaves would drown the song of my feathered victims."

Nevertheless, by the time the war of 1939 broke upon us Dr. Koch had succeeded in building up a large collection of the call notes and songs of many of our best-loved birds. During the war years, by making use of a portable recording gear that had been developed as a training kit, he was able to carry on his good work. His unrivalled collection of records, the envy of naturalists the world over, is now the property of the B.B.C., although Dr. Koch will not be satisfied until listeners have had the opportunity of hearing every bird in the British list.

If any reader has tried nature photography, or even bird-watching, he will know the many snags encountered. Such difficulties are tenfold where sound recording is concerned. With a camera you may be fortunate in getting close enough to a bird to take its photograph, but with sound recording gear you are up against such problems as outside noises, the temperament of the microphone, the possibility of electrical or mechanical faults, more than one bird singing at once—or your quarry refusing to sing at all!

On one occasion a yellow-hammer was too obliging. It actually perched on the



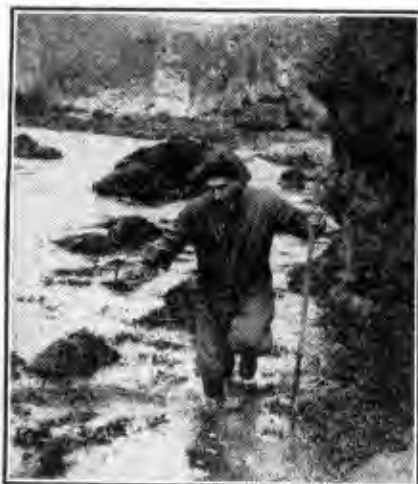
When a recording of their voices was played back to zebras they gathered around looking for the newcomer they could hear but could not see. Photograph, Camera Talks.



The microphone picks up the cheetah's voice for recording purposes. Photograph, Camera Talks.

microphone and sang so lustily that its notes were distorted! On another occasion Dr. Koch set out for Norfolk in the hopes of fulfilling an ambition of many years standing—to record the boom of the bittern on Horsey Mere. The recording gear was installed in a boat, and when night fell Dr. Koch and a B.B.C. engineer began nosing their way among the swampy reed beds trying to get within recording distance of their quarry. Alas for their hopes, the bittern tantalised them by keeping out of range. With the coming of dawn a storm sprang up, and the rustling of the dry reeds made any further attempt useless for the next two days. Then at last the wind abated. Conditions were ideal, and the bittern was giving voice well within range.

"Cut!" Dr. Koch breathed to the engineer, meaning of course to start recording. At that moment they became aware of another sound; a bomber squadron was circling almost overhead and the chance was lost. Even then their frustrations were not over, for the dampness of the atmosphere over the Mere resulted in a short circuit and for a third time their hopes were dashed to the ground. But Dr. Koch never admits defeat, and in the end the boom of the bittern was caught.



Dr. Koch hurries off with his microphone to record the voice of a baby seal that has been spotted on the beach of Skomer Island. Photograph, Paul Popper Ltd.

So sensitive is the microphone that sometimes it will pick up the sound of an aeroplane four miles distant; on the other hand, the microphone will not give proper definition or volume unless the bird is quite close to it. Another factor not generally known is that many radio sets cannot cope with the high frequency notes of some birds, those of the wren in particular.

Listeners frequently write to the B.B.C. saying that a nightingale, or perhaps some particularly rare bird, sings regularly in their gardens, but very seldom can these suggestions be followed up owing to the noise of traffic or some other interfering sound which makes recording impossible. Perfect conditions must prevail and a noiseless background is essential.

Dr. Koch's success is in no small degree due to his almost inexhaustible patience and fanatical zeal. He will spend days or nights inside a tarpaulin hide or other convenient shelter to achieve his objective. He is not satisfied merely by a few brief cadences from some songster. He does not consider his task complete until he has recorded a bird's whole vocabulary, song, courtship calls, alarm notes and so on. This may take several seasons to accomplish, but the quest will go on. Even so, there are a few birds which even Dr. Koch's untiring efforts have failed to get "on the air." For instance, the voice of the long-tailed tit has yet to be recorded.

Another exploit Ludwig Koch will never forget was his attempt to record the voice of the grey Atlantic seal at Skomer Island, off the coast of Pembrokeshire. With much help from the West Wales Field Society the microphone was taken 220 ft. down the sheer rock face of a cliff to a cave in which the bull and cow seals had secreted their babies. All was set for the great attempt to make recording history when a wind spring up that developed into a 100 m.p.h. gale. The yacht which had brought the party over from the mainland was smashed to matchwood and the substantially-built recording hut was swept away. Undeterred, Dr. Koch waited for the storm to subside and eventually recorded the voices of all the seal family successfully.

Another outstanding achievement was the recording of one of our most elusive birds, the greenshank, at its breeding grounds on the Scottish moors. With the expert assistance of Mr. Nethersole-Thompson, an authority on the greenshank, Dr. Koch located the nest, and with infinite caution crept towards it at night with his microphone. Not only did he record the voice of the hen bird, but also the sound of the eggs breaking open and the first feeble utterances of the young birds as they hatched!

Times without number the noise of a farm tractor, the clatter or whistle of a passing train, or the sound of a speeding car has completely ruined a recording.



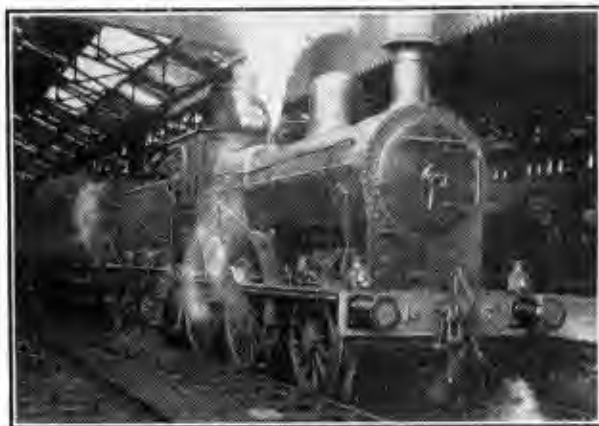
Coaxing a baby seal. Photograph, Paul Popper Ltd.

The Last Days of "The County Down"

By E. M. Patterson

THE Belfast and County Down Railway, known familiarly in Northern Ireland as "The County Down," is suffering the fate of so many of the minor Irish lines, and with increasing road competition is largely closing down. Until October 1948 the line was a separate entity, but then it became part of the Ulster Transport Authority's system. This, like its counterpart in Southern Ireland, Coras Iompair Éireann, controls both rail and road transport. The County Down system

A fairly recent visit to Northern Ireland gave the writer the opportunity of a final look at some sections of the line, which have been closed both to goods and passenger traffic since 16th January last. Only the Bangor line and the Belfast-Comber-Dunaghadee section now continue to operate. Through the courtesy of the Operating Superintendent the writer was given permission to travel on the locomotives working the down and up trains between Belfast and Ardglass early in January.



The veteran "County Down" 2-4-0 No. 6, at Queen's Quay, Belfast, before the run described in this article.

Armed with a footplate pass I found the 10.45 a.m. Belfast to Newcastle train at Platform 3 in the Queen's Quay station. The carriage set consisted of five six-wheeled coaches and one bogie coach, with first, second and third class accommodation, and was headed by a 2-4-0 locomotive, No. 6. This sturdy veteran was built by Beyer, Peacock and Co. Ltd. in 1894 and, still in its attractive dark green livery lined out in red and white, is the only passenger tender engine on the County Down. It rejoices in being the only one of its class with 6 ft. driving wheels

formerly covered 80 miles of track laid to the Irish standard 5 ft. 3 in. gauge, the main line connecting Belfast with the seaside town of Newcastle, 38½ miles away. There were branches to Bangor, from Comber to Donaghadee, Downpatrick to Ardglass, Ballynahinch Junction to Ballynahinch, and Newcastle to Castletewellan.

Much of the country traversed has a scattered and predominantly agricultural population that can be more efficiently served by road buses, and in consequence the density of passenger traffic has steadily declined during the last 20 years. Only the line connecting Belfast with the seaside town and business suburb of Bangor, 12 miles off, has maintained its passenger traffic, and with the speedy exit from the city, train times on this line have always been well ahead of road schedules.

and is mildly notorious with the footplate staff in possessing the smallest fire-box, which is only a fraction over 4 ft. 5 in. long. After mutual introductions to Driver Killen and Fireman McGarry, there were a few moments left to photograph the engine as it stood in the terminus station.

Passing the sheds we had a glimpse of some of the other County Down engines, most of which are Beyer-Peacock products, either 4-4-2 tanks or the now rare "Baltic" 4-6-4 type. A speed check at Dee Street bridge and we were rattling over the points at Ballymacarret Junction, with the twin tracks of the Bangor road going off on the left down the lough shore. Picking up speed again we passed the suburban stations of Bloomfield, Neil's Hill and Knock in quick succession and emerged into open country at



Connecting trains at Ballynahinch Junction. The branch line train on the right is powered by a 0-6-0 diesel locomotive.

Dundonald, five miles out, passing the up 9.40 a.m. from Newcastle headed by 4-4-2 No. 3. On the downhill run to the first stop at Comber our old engine got into her stride, clocking 53 m.p.h. between the sixth and seventh mileposts before shutting off to coast into the station. A five-minute halt was made at Comber while the 10.30 a.m. ex Donaghadee, worked by another 4-4-2 tank, No. 13, connected with our southbound train.

Once away from Comber the main line shrank from double to single track, worked on the Tyer's tablet system, and climbed into the hummocky centre of County Down, plunging through a series of noisy rock cuttings to Ballygowan. The four miles from Comber were covered in 8½ minutes, and Ballynahinch Junction, 17½ miles from Belfast, was reached at 11.25 a.m. A few passengers for the little market town of Ballynahinch, 3½ miles off, crossed the island platform to the two-coach train, powered by the 270 h.p. diesel-electric locomotive No. 2 that formerly did much of the work on the Ardglass branch.

At Crossgar, reached a minute late at 11.33 a.m., the automatic tablet exchanger was fitted to the left side of the cab in preparation

for the North Junction, where a loop-line, constructed in 1892, obviates the need for Newcastle trains to enter Downpatrick Town station and lose time in reversing out. Trains now stop at the Loop Platform, a mile from the town across the marshes of the River Quoile, and when we reached it at 11.40 a.m. I left old No. 6 until the return trip in the afternoon and crossed to the Downpatrick and Ardglass train. This was headed by No. 15, another of the inevitable 4-4-2 tanks, in charge of Driver Jimmy Breen and Fireman Joe Hanna.

We went bunker-first into the county town, ran round and backed into position at the head of the train of three coaches and two covered vans. On the free-covered hill above the station the cathedral bell tolled mid-day and five minutes later we headed out, past a fighting gaggle of wild geese, and past the signal cabin.

The Ardglass road was noticeably rougher than the main line and climbed in a striking succession of switchbacks over the rounded clay hills. Both mile and gradient posts were conspicuous by their absence. With the larger fire-box of No. 15, stoking was a less arduous task than with No. 6, and on the steep 1 in 50 bank to Ballynoe the gauge dropped 20 lb.



The diverging lines to Newcastle on the left, and Ballynahinch on the right, can be seen through the bridge in this photograph. The train is the 10.45 a.m. Belfast to Newcastle at Ballynahinch Junction.

from the blowing-off pressure of 160 lb. At Ballynec the stationmaster's garden brought to mind W. B. Yeats' "Nine bean rows . . . and a hive for the honey bee," but there were actually 14 of the latter strung out along the south-facing side of the shallow cutting. Did the bees ever swarm into a train? Driver Breen didn't think so but was certain that they never would attempt it in a bus.

The stops at Bright Hall and Killoogh were more in the nature of tokens to the timetable than anything else and apparently nobody but ourselves wanted to get to Ardglass. As a result, the working timetable allowance was found to be over-generous and we left the first of these stops at 4½ minutes and the second 7 minutes early. At Ardglass, reached at 12.26 p.m., our two passengers got off, "twice as many as usual" according to Guard Paddy Blaney. Paddy, it appeared, retired to Downpatrick nearly a year ago but had brought his uniform back into active service again for the last fortnight of the life of the line.

With three-quarters of an hour before the return run there was ample time for the leisurely collection of a broad traffic van from near the bufferless end of the line. As signs of the times, two laden U.T.A. lorries stood outside the little railhead and a green bus rolled into its depot, the latter perched vulture-like alongside the station.

At 1.12 p.m., two minutes late this time, we pulled out with rather more passengers than before. At Killoogh a four-minute halt to load on mail and meal bags put us six minutes behind schedule and gave the writer an opportunity to use his camera. Crossing the mud-banks behind Killoogh we put up a bonnet and chased it up the line for a hundred yards or so, until, with a decided flap of its wings, it left us. A long blast on the whistle for the Ballynec gate signal, up and down the switchback hills, past the Racecourse and Loop Platforms and we were back in Downpatrick Station at 1.37 p.m. Another run-round and we were out again to the loop to meet the 1.30 p.m. ex-Newcastle.

A far-off whistle across the grey marshes heralded the return of No. 6 and it drew alongside at 1.51 p.m. The morning crew were now replaced by Driver Addy Richmond and Fireman John Coates and four minutes later we were off up the long bank to Chesham. Steadily coaling into the small fire-box kept the steam pressure from falling much below the 140 lb. mark and we arrived at 2.7 p.m. to find that a 4½ minute pause was required to pick up a van, this giving the gauge an opportunity



B. and C.D.R. No. 15, one of the 4-4-2 tanks ready to leave Downpatrick on the 12.5 p.m. for Ardglass.

to creep round to an indicated 165 lb. With a good head of steam we accelerated away to Ballynabinn Junction, taking 8 minutes for the steeply graded 3½ miles. Water was taken during the two-minute halt there and we got away at 2.22 p.m., six minutes late. So on, past Southfield, the derelict-looking little halt of Shephard's Bridge, and Ballygowan, where a message carved in letters of stone below the workhouse clock told us "The Time is Short," a fact of which the driver was already keenly aware. But old No. 6 was in no hurry and try as we would we could only clip two minutes off our last six minutes before Dromahaire, to lose it again at a signal check before Ballymacarret and arrive back in Belfast at 3.4 p.m.

As I write this, the last trains from Ardglass and Newcastle have left, large crowds thronging Newcastle station to watch the departure of the last train from there. Many made the journey to Belfast, fireworks were exploded, and straps, pictures, and many other items were taken by souvenir collectors. The last coach carried a tombstone inscribed: "In memory of the Belfast and County Down Railway, born 1869, re-interred 1950."

Air News

By John W. R. Taylor

"Superforts" for the R.A.F.

Bomber Command R.A.F. is taking delivery of 70 ex-U.S.A.F. Boeing B-29 "Superfortress" bombers, so as to maintain its operational efficiency until new British heavy jet bombers are ready for service. These "Superfortresses" are of the type used to bomb Japan during the war. The aircraft are being flown by U.S.A.F. pilots to Marlham, Lakeside and Scunthorpe airfields and there handed over to R.A.F. crews, who will be trained by American "Superfortress" crews stationed in this country.

Meanwhile the U.S.A.F. has announced a new and more formidable version of the B-29's "big brother," the B-50 "Superfortress," designated B-50D. As can be seen in the photograph on this page, the B-50D retains all the basic features of earlier types, but has

Planning, Department of Health for Scotland, and other Government departments. About 5,000 sq. miles of England and Scotland are being covered for the Ordnance Survey alone.

Among towns being photographed for the purpose of making new 60-in. to the mile ordnance maps are Aberdeen, Chalfont, Gillingham (Kent), Gloucester, Gravesend, Leicester, Nottingham and Poole. Many rural areas also are being surveyed, as well as certain special regions such as railway sidings and traffic congestion areas. One important task was the air photography of the Severn Valley flood areas.

Aircraft being used for the work include "Mosquitos," "Spitfires" and "Ansons," a few of which are based at the R.A.F. Station at Lanchairs in Fifehire.

"Canberra" to be Built in Australia

The English Electric "Canberra" jet bomber is to be built for the R.A.F. at the Australian Government aircraft factory at Fishermen's Bend, Melbourne, superseding the present production line of "Lancaster" bombers. Announcing this decision, the Rt. Hon. R. G. Casey, Minister for Supply and Development, said that the "Canberra" had been selected by the R.A.F. as the bomber most suitable for operation in the Australian region, after close examination of all types of aircraft in production or being prepared for production in Britain for the R.A.F. and the R.N.

Each of the Australian "Canberras" will be fitted with two C.A.C.-built Rolls-Royce "Tay" engines, which are basically similar to the "Nene" but rather more powerful.

Cloud-Warning Radar

R.A.C.'s Operational Development Unit is making a series of research flights with ESCO airborne cloud-and-collision warning radar, at the request of the Ministry of Civil Aviation.

The first half of the trials, carried out in the Singapore area with a "Hythe" flying boat, were intended to test the efficiency of the equipment in detecting, identifying and avoiding cumulo-nimbus cloud, which often contains conflicting air currents fierce enough to tear an aircraft to pieces. They showed that various types of cumulus cloud with vertical depths ranging from 1,500 to 41,000 ft. can be picked up by the radar scanner and so be avoided easily by the pilot. Gaps in cloud which could not be seen by the naked eye were prominently displayed on the cathode-ray tube.

The same equipment will, of course, indicate other aircraft with which there might be danger of collision and it was also used at Singapore as "blind" landing aid. It was found that height could be reduced to 100 ft. over the edge of an airfield with sufficient accuracy to effect a landing. Further tests to determine the usefulness of the equipment for navigational purposes are now in hand at Hurn in Hampshire.

Piasecki Win \$10 Million Order

By winning a U.S.A.F. design contest for a large Arctic rescue helicopter, the Piasecki Helicopter Corporation has established itself as the most important manufacturer of large transport helicopters in the world. This particular success has not only gained for the company a U.S.A.F. contract worth about \$10,000,000, but means that Piasecki aircraft will almost certainly be chosen for the first full-scale passenger and freight helicopter services in the New York City area when the Civil Aeronautics Board gives their approval for such services to be started.



The new Boeing B-50D "Superfortress" heavy bomber. Photograph by courtesy of the Boeing Airplane Company, U.S.A.

a redesigned moulded Plexiglass nose, new-type radar equipment under its fuselage, and provision for carrying a large external fuel tank under each wing, outboard of the engines, to increase its operational range.

The new B-50D weighs over 73 tons and can carry five tons of bombs over a round trip of 6,000 miles, cruising at over 300 m.p.h. If desired, two 4,000 lb. bombs can be hung under the wings instead of external fuel tanks, in which form the B-50D has a maximum bomb load of 14 tons for short ranges.

All the B-50 type "Superfortresses" are powered by four 3,500 h.p. Pratt and Whitney "Wasp Major" engines, as fitted to the "Stratocruiser," giving a 50 per cent. power increase over the Wright "Cyclones" fitted to the earlier B-29. Boeing have orders for 222 B-50Ds for the U.S.A.F., all of which will be fitted with flight refuelling equipment.

R.A.F. Survey Programme

The R.A.F. Central Photographic Establishment at Benson in Oxfordshire is this year carrying out a comprehensive programme of aerial photography for the Ordnance Survey, Ministry of Town and Country



North American B-45 "Tornado" four-jet bomber. Some "Tornadoes" are being modified for high speed target duties. Photograph by courtesy of North American Aviation, U.S.A.

Mediterranean Air-Sea Rescue

A successful air-sea rescue operation was carried out recently by the R.A.F. in the Mediterranean, when two fighters landing an American ship off Larnaca, Cyprus, broke adrift in heavy seas at about midnight.

An R.A.F. "Beaufighter" from Nicotia took off at first light in a high wind to search local waters for the craft, which had eight men on board. After a short time the "Beaufighter" pilot spotted one of the fighters, and this was relayed to two other R.A.F. rescue launchers dispatched a few hours earlier. Later a "Lancaster" from the Central Air Navigation School at Shawbury, Shropshire, engaged on a training flight, found the second fighter abandoned.

Jet Bombers for Target Towing

A total of 14 North American B-45 "Tornado" four-jet bombers, as illustrated above, are being modified for high-speed target-towing work, to give pilots of U.S. Air Force jet fighters practice in shooting at targets moving at speeds of up to 400 m.p.h. and at altitudes near 40,000 ft.

The "Tornado" was chosen for the job because of its ability to fly fast and high, towing a specially-built 20 ft. span Chance Vought glider. Chief modification is the mounting of a tow-cable reel assembly in the rear bomb-bay, the cable being controlled by a target operator in the tail-gunner's position in the bomber.

In tests at Edwards Air Force Base, Muroc Dry Lake, U.S.A., the target has been towed off the desert floor close behind the bomber, and reeled out at height for fighter gunnery practice with live ammunition. Landing techniques for the bomber and the target have also been worked out at the desert test base, an automatic nose skid mechanism on the glider releasing the tow-cable as soon as the glider contacts the ground after a long run.

New R.A.F. Trainers

Two British training aircraft, the Boulton Paul "Balliol" Mk. 2 and the Vickers "Varsity," have been ordered for R.A.F. Flying Training Command.

The "Balliol" Mk. 2 two-seat advanced trainer was described in the April 1949 "Air News." It has been chosen after many months of tests at home and abroad in competition with the Avro "Athlete" to replace the

North American "Harvards" supplied under wartime Lease-Lend. The "Balliol" is powered by a 1,245 h.p. Rolls-Royce "Merlin" engine, and can be used for day or night training in flying, gunnery, navigation and fighter bombing. It can also be adapted easily for deck-landing instruction and rocket firing practice.

The "Varsity" contract will help to compensate Vickers for a drastic cutback in orders for the "Valeutia," following the Government's decision to reduce the size of R.A.F. Transport Command. The "Varsity" is a development of the "Valeutia" and can be built largely on the same lines. It combines in one aircraft all facilities necessary to train pilots, navigators, bomb-aimers and radio-radar operators on multi-engine aircraft.

First of the New

Captain Richard Rymer, 31-year-old skipper of British European Airways, has gained the distinction of being the first commercial pilot in the world officially qualified to fly propeller-powered air liners. The qualification takes the form of a special endorsement on his normal commercial pilot's licence.

As Senior Training Captain at Northolt, Capt. Rymer has been sharing with Capt. "Mutt" Summers, Vickers Chief Test Pilot, in the handling trials of the propeller Vickers "Viscount" 40-seater air liner, which is on order for B.E.A. and for British West Indian Airways. Having put in some 30 flying hours in the "Viscount," Captain Rymer has thus become the first airline pilot in the world to qualify on the new type.



Douglas DC-3 air liner of Aer Lingus in front of the terminal building at Dublin Airport. Photograph by Aer Lingus, Eire.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"MECHANICS FOR THE HOME STUDENT"

By ERIC N. SIMONS
(Hill and Sons Ltd. 7/6 net)

Mr. Simons has had the happy idea of explaining the laws of mechanics in a way that can readily be understood by anyone. In preparing this "teach yourself volume" he has had the valuable assistance of Mr. W. D. Burnet, B.Sc., who largely shares his views on the need for simple explanation of the fundamental ideas of this science.

The result of the efforts of the author and his collaborator is a book that will be particularly suitable for those who for any reason are unable to attend classes of instruction, or who cannot make use of a good technical library. In addition it should be of special value to beginners, as it is not cluttered with mathematical symbols and diagrams, or written in abstruse technical language. Instead everything in the book is explained simply, with a wealth of interesting every-day examples of the applications of the principles of mechanics. A few diagrams are of course essential, but these are well thought out and play a definite part in the careful development of the subjects concerned.

A very large amount of ground is covered, beginning with action and reaction, mass and motion, from which we pass on to the effects of force on mass and other developments. Friction and machines are then considered, after which are sections on such topics as density, centre of gravity, fluids and vibration. Impact and rotation are dealt with, and finally there is an interesting discussion on mechanism that suggests how the knowledge of mechanics gained in the book can be put to practical use. There is an excellent index, a very useful feature.

"WOODWORK FOR BOYS"

By W. F. MATTHEW

"MODELMAKING FOR BOYS"

By H. S. COLEMAN
(English Universities Press, 5/- each)

Here are two further volumes in the "Junior Teach Yourself" series, written specially to introduce boys from about 11 years of age upward to the delights of various hobbies.

Mr. Matthew emphasises that the use of the tools mentioned and the various jobs described in his book are simple enough to be within the scope of the average boy working by himself, while no great outlay of money is essential for any of the models dealt with. He begins with a real job, the making of a small personal bookcase, leaving details of tools and timbers to the times when these come into the story. The result is that when the bookcase has been made the modelmaker has learned many useful wrinkles and is in a position to pass on easily to the later and more advanced models in the series, which includes a bedside table, a homework desk, a display cabinet, a tobacco jar and a sectional bookcase with cupboards.

Mr. Coleman is concerned with models generally, and he gives details of an interesting series including a toy sailing yacht, a miniature of Drake's "Golden Hind," a beginner's marine steam plant, a cargo boat and a flying model of a cabin monoplane. These details are prefaced by an appreciation of the spirit of modelmaking, in which boys are encouraged to develop not only skilled fingers, but also powers of observation, and to study advanced models in various quarters in order to find inspiration.

Both books are well illustrated and include plans are given as guides in actual construction.

"THE TAFF VALE RAILWAY"

By D. S. BARRIE, M.B.E., A.M.I.M.E.
(Oakwood Press, 5/-)

This is the second edition of Mr. Barrie's "The Taff Vale Railway." The first appeared in 1939 and was reviewed in the "M.M." at the time. In its new form the book includes additional material and illustrations, and opportunity has been taken to amplify some of the data appearing in the first edition.

The Taff Vale Railway, the first of any size in South Wales, was acknowledged to be the premier line of that district, which saw Trevithick's Pen-y-darraig locomotive, the first steam engine ever to haul a load on rails. Not only was it an energetic and progressive system; it was also a strongly individual concern in various ways, and under good management it enjoyed a long period of prosperity. The author deals ably and comprehensively with its origin and development, and records the bold dock-owning venture at Penarth and the fierce rivalry with other South Wales railways. Traffic operation, which had characteristic peculiarities, the development of the locomotives and details of equipment are all considered.

A map of the railway as it had grown by 1922 when taken over by the G.W.R., enables the reader to grasp something of the railway ramifications of South Wales. The half-tone illustrations are good and the account concludes with some statistical details of mileage and traffic.

"MODERN TABLE TENNIS"

By JACK CARRINGTON (Bell & Bell)

There could be no better guide to table tennis than Mr. Carrington, who is not only a player of high rank himself, but also has taken special pains to study every aspect of the game and to place his knowledge on paper. He has had a great amount of experience in dealing with the problems of the learner, and in particular is able to start the beginner off on right lines. He has been a world doubles championship finalist, and was the teacher of Johnny Leach, world singles champion in 1949, who contributes an eloquent tribute to his training methods.

Mr. Carrington begins with two chapters for the beginner, dealing with equipment and giving explanations of technical terms. The grip and the service are next considered, with excellent advice on the continuation of the rally, after which we plunge into the open game that he favours. Tactics are next discussed, for both singles and doubles play, and the book ends with a section on championship play, in which there are many interesting facts about great players and the ideas that they put into practice.

The book is illustrated by photographs showing how to produce various strokes, with good diagrams in the text and a series of humorous drawings.

"TRAINS IN COLOUR"

(The Alan Watts)

The title indicates exactly the scope of this publication, which will appeal principally to the younger railway enthusiasts, as its coloured illustrations are its outstanding feature. These include a double-page picture of a recent London Midland 4-6-2 and others in full colour, with a series of attractive tinted sketches that have a definite "atmosphere." The illustrations, all of which are effective in themselves, are backed up by suitable text, well printed in easily-read type.

As a preliminary in more comprehensive books for those whose hobby is railways "Trains in Colour" is an excellent production.

"THE SOVIET AIR FORCE"

By ASHLEY LEE (Duckworth, Price 8/6)

This book tells the story of the Soviet Air Force since its formation in the early 1920s and gives a detailed account of its development and achievements during the Second World War. The author, as a senior Air Ministry intelligence officer during that war, had excellent opportunities of assessing the worth of Soviet military and naval aviation.

After describing the origin of this Air Force and the many changes in organisation that have marked its growth, he deals with the Soviet air training system from its earliest days, the development of the airborne and parachute troop units since the first of these was formed in the Red Air Force in 1930, and with the growth of the Soviet aircraft industry.

The chapters on the critical two years before the Stalingrad campaign in 1943, which turned the tide of war in Russia's favour, and on the victorious two years that followed this decisive battle, give a dramatic insight into the manner in which the Soviet Air Force eventually passed from the defensive to the offensive. The development of the Soviet long-range bomber is dealt with at length.

In his final chapter the author discusses Soviet progress in the fields of jet aircraft, rocket planes, ground and air-launched rockets, radar, and atom bombs. In the light of such data as is available on these matters he discusses the present and future capabilities of the Soviet Air Force, and helps us to find the answers to such topical questions as the extent to which that Air Force is dependent on technical assistance and supplies from abroad, and what assistance of this kind Russia is now getting.

The book is illustrated with several half-tone photographs and a map.

"TRAINS PHOTOPIX"

(Ian Allan, 1/6)

This is a collection of photographic reproductions of locomotives and trains. In it named trains are prominent, and there are various shots taken during the great locomotive exchange trials of 1948. A few American trains are included, and there are Royal Train subjects, footplate action pictures and one or two Works photographs. Most of the pictures show trains hauled by steam locomotives, but electric and diesel haulage also are represented.

Although some of the subjects have appeared elsewhere, the collection as a whole is pleasing and the items comprising it will no doubt be scanned eagerly by enthusiasts. Keen "spotters" will notice one unfortunate caption, but on the whole the descriptive matter is quite appropriate.

"JUNGLE HAVEN"By ALBERT L. STILLMAN
(Robert Hale, 7/6 net)

This is an extraordinary story of adventure in the wilds of the upper Amazon, where two boys and their tutor, stranded without clothing, weapons or other resources, not only wrest a living from their surroundings, but introduce many of the features of civilisation.

The two boys are really princes of a small Italian kingdom who were forced to fly by revolutionists. They were hotly pursued by secret police, but managed to get aboard a ship sailing for Brazil, and not only to escape the bombs of airmen from their own country, but actually to bring down the machines that threatened them. Penetrating into the jungle in order to hide themselves, they are captured by Indians who drug and strip them, leaving them in the path of a swarm of ants. Even this danger is escaped, to be followed by many other amazing perils and even more astonishing accomplishments in the home that they build in the wilds. One of them even becomes the king of an Indian tribe. They are indeed modern Robinson Crusoes who have the advantage that the tutor is a trained scientist, who seems to know practically everything!

The book is full of interest as well as adventure. It is illustrated by vivid line drawings.

"THE MODEL BOAT BOOK"

By G. H. DEASON (Drysdale Press, 7/6)

Ship modellers include among their number many who cling to sail as well as those who are more mechanically minded and love to build models driven by steam, petrol or oil engines, or by electric motors. This book meets the needs of all of these, giving constructional details of a variety of craft that will provide sure guides for the builders. Some of the models are of simple straightforward construction and are suitable for beginners, while others will appeal to more advanced workers.

The first section of the book deals with sailing craft, beginning with a little 13 in. sailing sloop for the novice, and ending with a fine M Class racing yacht model. Then we turn to powered models, the first of which is a simple electric launch that can be built for a few shillings. This is followed by a variety of vessels, including a hydroplane, a cabin cruiser, air-sea rescue launches and a very fine river cruiser, a scaled down replica of a 38 ft. boat by Thorneycrofts. Lovers of historic sailing ships will find details of a fine decorative galleon. Finally come special chapters on model steam plants suitable for installation in model boats and on electric and diesel installations.

For each of the craft dealt with there are scale drawings, with full details of material and methods of working, and amplified full size working drawings of all models described are available from the publishers of the book. Excellent half-tones show the various craft, mostly complete but in some instances at various stages of construction, and these will help the enthusiast to select a suitable vessel for his constructive efforts.

"DRAGON PROWS WESTWARD"By WILLIAM H. BUNCE
(Museum Press, 6/- net)

This is a story of what might have happened when, 500 years before Columbus, hardy Vikings sailed their dragon ships from Iceland to Greenland and thence to the coast of North America. Vinland, as these rovers called the land they discovered, was rich and attractive, and in this book we have the story of a Norse trader who voyaged there and of the youngest member of his crew, a boy who became friendly with peaceful Indians. There are many exciting incidents, which had their origin in raids by fierce warriors, from the interior of the country who in the end were repulsed with the aid of the men of the dragon ship.

There is a coloured frontispiece with several full page line drawings.

"BUSES AND TRAMS"Edited by CHARLES F. KLAFFER
(Jan Allan, 8/6)

Interest in public service road vehicles has never been greater than at the present time, and this new book, edited by an acknowledged expert, covers the subject thoroughly. It gives a wealth of information, ranging from a brief history of British buses, to memories of tramway systems now vanished. The enthusiast who wants to know something about the engine that drives his bus will find it here. Road testing and the various markings displayed on the majority of buses provide topics for other interesting contributions, and motor coach tours, Airport buses, cable trams and many aspects of public transport are dealt with fully, the story ending with an entertaining account of the rural bus in operation.

The illustrations, of which there are a great many, are all of excellent quality and cover the past as well as the present. A very attractive feature is the coloured illustration on the front cover, which shows tram and bus traffic on Westminster Bridge.

"Buses and Trams" is well printed on art paper and is excellent value for its price. Copies can be obtained from leading booksellers or direct from the publishers, Ian Allan Ltd., Mail Order Dept., 33 Knollys Road, Streatham, London S.W.16, price 9/- including postage.

Electricity Makes Time Fly!

By Eric Vivian

I ALWAYS wanted to be an electrical engineer, right from the time when I was just old enough to turn the handle of my brother's dynamo and produce a tiny light in a flashlamp bulb. Later, I made Morse buzzers and shocking coils, and saved up for an electric motor to drive my Meccano models. Once I had to write an essay on "What I Want To Be When I Leave School," and I described how, as an electrical engineer, I would join electrical cables in the street. Although I knew an electrical engineer must have many more interesting things to do, this was the only one I could write about at the time. My teacher seemed to think I ought to aim higher than a hole in the street, but he knew no more than I about the other kinds of jobs an electrical engineer has to do, and I often wished I had someone to advise me on the subject.

I am now able to describe these other jobs, after five years of study and ten years of experience as a professional engineer. I have never yet joined electrical cables in the street, nor am I likely to, but I could tell the joiner what size cables to use, and where they must be laid, which is often much more difficult than actually joining the cables together!

In contrast to the cable joiner, I do all my work on paper, in the form of letters, reports, drawings and calculations. This may sound very dull, but actually it is full of interest, as I hope will be seen from the following description of a few days of my business life.

I usually go to the office every morning, but occasionally I visit manufacturers of electrical machinery to see the equipment which my firm has ordered, or to discuss technical problems with them. On one occasion recently I spent a few days in the north of England on one of these visits and when I arrived back in the office I found a large pile of papers on my desk, on top of which was a thick wad of them labelled "No. 5 Timber Plant—URGENT." I had been expecting this for some time, and now I knew I would have to move quickly.

After I had dealt with various routine matters I was free to deal with No. 5 Timber Plant. This was the name of a large



Overhead high voltage transmission line stretching across country. The illustrations to this article are reproduced by courtesy of British Insulated Callenders Cables Ltd.

project consisting of several factories and an office which my firm was building in a remote part of a tropical country, to cut and pulp timber and to manufacture certain by-products. I am responsible for ordering the electrical equipment required for the whole of the plant and for supplying it with electric power, while other engineers in my firm order the buildings, mechanical equipment, air conditioning plant, water supply, drainage, and so on. I have to co-operate with all these engineers, since their work involves the use of electricity in some form or other, such as lighting, motors for pumping, heaters, fans, etc. This is one of the reasons why my job is so interesting and also why I am always so busy!

I had expected the work on the Timber Plant to start, because at a meeting some months earlier I had been asked to estimate what amount of electric power would be required for the plant and what would be the cost of a supply line or cable from the nearest power station. At the time, I worked out several different schemes very roughly, and found the cheapest would cost about £55,000, to provide an overhead transmission line and substations. This scheme had been approved by my chief after very long discussions

concerning the relative merits of different schemes, about which I shall have more to say later. Incidentally, both the siting of the plant and the amount of power required were subsequently changed, so we had to start arguing all over again, before the final scheme was adopted!

The first of the Timber Plant papers with which I dealt was the copy of an order for a large steel building described as "Main Factory and Workshop," issued by a mechanical engineer in my firm. I spoke to him on the internal telephone and asked him if he had prepared drawings showing the arrangement of the building and the machines in the workshop. This had been done, I was pleased to find, and he was able to let me have copies, which I studied very carefully. I then telephoned the drawing office for Mr. Reilly, one of the electrical draughtsmen, and explained to him that drawings were urgently required for the electrical lighting and power installation for the Timber Plant main factory and workshop. Together we discussed the plans in detail, until he had a sheaf of notes, rough sketches and calculations. Then we noticed an unusual bustle was going on outside the office, and when we looked up at the clock, we realised it was the noise of people on their

way home. Like most others, the day had gone like a flash, and we looked at each other in astonishment and exclaimed "*How the time flies!*"

The following morning, I sent for Mr. Reilly again as soon as I had dealt with the mail, and we had another session together until he had sufficient information to enable him to prepare the drawings. It would take too long to describe in detail all the points we discussed when planning the installation, but briefly these included making a list of all the electrical machines in the factory and finding the total power required, with an estimate of the power required for lighting, deciding the position and size of the main switch-board and cables and cable trenches, and trenches for oil-drainage, allowing for future extensions, if there are likely to be any. A power supply to the overhead cranes, battery charging plant, air-conditioning equipment, power sockets and so on had to be provided, and a check made to ensure that all the machines had been ordered with the correct type of electrical equipment, i.e., the right voltage, suitable for a tropical climate, etc.

This covers the power installations. What value of lighting intensity, in lumens per square foot, was required for the type of work done in the various parts of the plant had to be decided. Should fluorescent or ordinary tungsten lighting be used? Fluorescent uses less electricity for the same amount of light, but the cost of the fittings is very high. We decided to have tungsten lighting, as we were to make our own electricity very cheaply by using waste fuel from our timber plants.

Should we obtain the amount of light we require by using a few large fittings or many small ones? We decide on a compromise after taking into account the mounting height, the type and cost of various fittings, how soon they could be obtained, how much maintenance they need, whether we wish to standardise on any particular types, and how their position will fit in with the roof trusses of the building.

Lists had to be made of the material required, such as sockets and portable lights, telephones, fans, fires, water heaters, steel conduit, fuse boxes, clips, screws, and so on. All these had to be ordered and shown on the drawings, so that when they were sent abroad to the building site, the equipment could be installed in exactly the way we have planned.



Laying underground cables is more costly and strenuous than erecting an overhead line, with its widely-spaced towers.

When Mr. Reilly left me, and returned to the drawing office, he had enough work to last him for several weeks, and I have seen little of him since, except to ask him how he is getting on and to settle a few queries. At the same time, I was concentrating on the details of the power line to the timber plant, so that I could order the material as early as possible.

A brief description of the way in which an electrical engineer designs a power transmission line may be of interest. Once the positions of the power station, at the "sending" end of the line, and the sub-station, at the "receiving" end, and the amount of power to be transmitted have

been settled, he can treat the problem as a purely technical question. The first step is to decide whether to erect an overhead transmission line consisting of bare copper wires supported from insulators on towers or poles, or to lay an underground cable, which is more expensive but is hidden away where it cannot spoil the scenery or be damaged by lightning or stone throwing. The accompanying illustrations of a cable and an overhead line show

clearly the reason for the high cost of a cable system—the labour involved in digging the trenches and making elaborate joints, compared with that required for the erection of widely-spaced transmission towers. In the case of the Timber Plant, we decided to install an overhead line instead of an underground cable, because the country is wild and remote.

The route was surveyed by taking photographs from an aircraft, and the path of the line was marked in ink on these photographs, with a small circle for each tower. The siting of some of these towers could not be finally settled by photography alone, so we arranged for a surveyor and a draughtsman to go abroad for a few weeks and visit the actual territory. Because Mr. Reilly had acquired a reputation for accurate and rapid work,

and has never lost a chance to get himself on a tour abroad, he was one of the people chosen. He will fly there as soon as he has finished his urgent drawings and has had certain inoculations and seen that his passport and visa are in order.

For the line to the Timber Plant, the cost of three schemes with voltages of 11,000, 33,000 and 66,000 volts was worked out in detail, including the cost of transformers, switchgear, and sub-station buildings, and the middle one was selected as it was slightly cheaper. The final drawings of this scheme are still being prepared, and I am writing out orders and specifications as fast as I can. When the

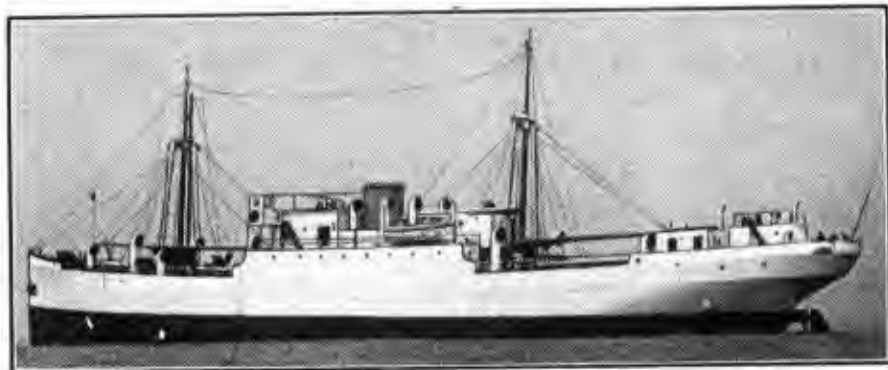
actual construction starts, there is sure to be a fresh batch of problems concerning alterations to the plant, missing material, and so on, all of which form part of an electrical engineer's job.

Thus I have found that the interest in electrical engineering lies not as I imagined when I was a boy, in such comparatively simple practical tasks as cable jointing, but in solving at my desk a constant stream of varied and pressing problems. Of course, the cable-



A cable jointer at work on a straight connection.

jointer works outdoors in all climates, with only a tent to cover him, and he has a healthy occupation with plenty of variety, at least so far as changes of scenery are concerned. The photograph reproduced on this page shows him at work after he has made the connections inside the bottom half of the cable box. The important thing about his task is for him to keep everything scrupulously clean and tidy. But his job is so very much easier than mine that I should be happy if I could take his place—but only for a few weeks, until the work became monotonous. Then I should long to have my problems back again, to say nothing of my salary! Most satisfying of all, is to see my mental effort result in light and power, industry and prosperity, in dark and undeveloped places.



M.V. "Palacio," one of five sister ships of the fruit carrying fleet of MacAndrews and Co. Ltd., Liverpool.

Shipping Notes

FIVE FAMOUS FRUIT SHIPS

The fruit trade has always been a particularly interesting and romantic side of the shipping business, ever since the early 19th century, when it was carried on by smart-looking schooners.

It is generally agreed that no steamer or motorship can have the same appeal as the old-fashioned sailing ships. Though this may be true, the author feels that the small white motorship shown in the illustration at the top of this page is certainly as smart as any schooner, and when we think of the luscious fruit which she brings to our table she will endear herself to us to an even greater extent!

This vessel is one of five sisters, which were built in 1927 by Harland and Wolff Ltd., for MacAndrews and Co. Ltd., of Liverpool, who are among the most important carriers of fruit to British ports. These five vessels were specially designed by the builders and among other noteworthy features is their very shallow draught. The loaded draught is 7 ft. 14 in., and this enables the vessels to get into a number of small Spanish ports. At times these four ships may well have to face a stormy passage across the Bay of Biscay and up the English Channel to the United Kingdom and Continental ports, so they must be good sea boats as well as possessing other very important characteristics.

The dimensions of these vessels are: Length 270 ft., breadth 39 ft., depth 17 ft. 6 in., gross tonnage 1,375. The capacity is 143,000 cu. ft. It will be noticed that the machinery is housed amidships, and the propelling machinery consists of a four-cylinder single-acting diesel engine of Harland & W. design, which gives the ship a speed of 12 knots and a very low fuel consumption. The engine develops 1,400 h.p.g. The names of these five sisters were "Ponson," "Palacio," "Pinta," "Palacio," and "Packer." The series of MacAndrews motorships of this type started with the "Ponson" and "Packer," each having a deadweight of 2,200 tons, a capacity of 106,000 cu. ft. and a speed of 12 knots, built in 1922. The services which this company maintains are between Spanish, Portuguese and Moroccan ports and London, Liverpool, Glasgow, Swansea, Hull, Middlesbrough, Antwerp and Hamburg. The reader will agree that the fortunate passengers for whom accommodation is provided on these "Orange and Lemon" ships should feel very pleased with life. Travelling in a ship is a treat to most of us, but when a sea voyage means a trip on one of these little fruiters, the journey will be more like a voyage in a large private yacht than travelling in a high-class cargo boat.

Denise Renwick.

FITTING "MAURETANIA'S" NEW PROPELLERS

The lower illustration on this page shows the Cunard-White Star liner "Mauretania" in the King George V graving dock at Southampton. The liner has had the tail-shafts drawn and examined, and new propellers are being fitted. At the time when the photograph was taken, the starboard propeller was about to be lifted into line with its shaft.

The difficulty of the job lies not in the lift, which only takes a short time although the propeller weighs 19 tons, but in lining up the key-way in the boss with the key on the tail-shaft, which has been carefully ruled and polished to receive the propeller. So that key and key-way may meet precisely when the propeller is suspended by the jacks, the shaft may have to be turned very slowly by means of land gear in the engine-room. When key and key-way do meet, the propeller will be drawn on to the shaft by a further tackle. Power for the tackles is supplied by the liner's own winches.

BERNARD J. FARMER.



Fitting a new propeller on the Cunard-White Star liner "Mauretania" in dry dock at Southampton.

Railway Notes

By R. A. H. Weight

Summer Services, and Excursion Facilities

British Railways summer time-tables will come into operation on 5th June, when a considerable extension of seat reservation facilities will be introduced for main line trains. We hope to make reference in a later issue to some of the improved or new services provided. Meantime, excursion and cheap ticket bookings have been further extended. Race meetings, important football matches and other notable occasions in the sporting world sometimes necessitate a series of special trains.

News from the Scottish Region

The organisation of freight train working is at all times a complicated and expert business, but with the merging of the interests and arrangements of the two former railway groups in Scotland, it has been possible to eliminate many circuitous routes. This has resulted in improved service for traders as well as the more economical use of available vehicles and resources.

The District Traffic Control Office at Burntisland, originally established by former North British Railway staff, has been lately modernised, improved in layout and provided with a remarkably complete system of telephones. It is concerned with the busy coalfields of Fife-shire and also regulates traffic working on main or secondary lines extending to Stirling, St. Andrews, Perth, the Forth Bridge, Kinross Junction (2½ miles north of Montrose) and Dundee.

It is hoped to complete before the end of May the installation of permanent bridges to replace the temporary ones erected, with remarkable promptitude, after the disastrous floods that caused so much damage to the East Coast main line north of Berwick-on-Tweed in the summer of 1948. This engineering work, which has of necessity proved very costly, should shortly restore this important trunk route to its normal stability.

On Sundays while the work is in progress, trains are being diverted by way of Tweedmouth and Kelso, the route that unavoidably had to be used temporarily in the autumn of 1948.

The last of the Highland Railway "Clan" class 4-6-0 engines, which first appeared in 1919, has been withdrawn from traffic and made its last journey to Kilmarnock Works for breaking up. This is "Clan Mackinnon," British Railways No. 84767. It was built in 1921 as one of a series of eight, constituting the last design for the Highland Railway prior to the grouping in 1923. The "Clans" were superheated locomotives, having a Belpaire fire-box, driving wheels 6 ft. in diameter, and rather large outside cylinders.

One I.R. "Loch" class outside cylinder 4-4-0 of a much older type, carrying L.M.S. number 14385, "Loch Tay," was lately reported still at work on light duties from Forres shed. Some of the Cumming 4-6-0 goods engines, the 5 ft. 3 in. version of the "Clans," are still to be seen, together with a few remembered "Small Bear" 4-4-0s. There are also two 0-4-4T Nos. 55081/3, lettered "British Railways," working on the Dornoch Branch, and other survivors of the erstwhile Highland stock. Some of the Highland

4-6-0s worked into Glasgow on various services under L.M.S. administration.

There are still on the active list, over 30 of the "X9" class former North British engines. They are known as "pugs," like many other useful little 0-4-0 shunting tanks. Some of them run with small wooden wagons attached in order to act as coal bunkers as their own coal carrying capacity is so small.

New class "S" 4-6-0s built at Horwich for service from shed 68A, Carlisle, Kingmoor, are Nos. 4470-3. These have roller bearings on the driving axle only.

Western Region Locomotive Notes

The first of the 44xx 2-6-2T series to be withdrawn was No. 4402. This was a small class of sturdy design originated in 1904.

New engines lately placed in service were: 4-6-0 No. 7911 "Lady Margaret Hall"; 0-6-0T Nos. 7442-4, built at Swindon and allocated respectively to Slough, Cross Newydd, and Carmarthen; No. 8456, constructed by the Yorkshire Engine Co. Ltd., stationed at Taunton; and Nos. 9410-11, from Robert Stephenson and Hawthorn Ltd. shedded at Barry.

Special Trains for French State Visit

The special Pullman-car expresses conveying the



A clean green L.N.E.R. RL4-6-0 No. 1272 at Mark's Tey. Driver Wilkin and fireman Kerrison watch the camera with interest. Photograph by C. R. Mortimer.

French President and his party to and from London (Victoria) and Dover in March last, which were treated as Royal specials, were headed by spotless blue "Merchant Navy" No. 35049 "French Line, C. & T." This engine created much interest in Kent, having been loaned from Nine Elms (Western Section) shed and placed in the temporary care of Dover crews. The standby engine was one of the latest "West Country's."

Main Line Electric Engines Under Construction

For use on the Sheffield-Manchester main line and certain branches now in course of electrification with overhead contact system, 84 powerful mixed-traffic locomotives are being built, partly in Tipton Works and partly by the Metropolitan-Vickers Electrical Co. Ltd., Manchester. There are intended to be 57 of the Bo+Co or double-hogge four-axle type, also 27 Co+Co or double-hogge six-axle type. The prototype Bo+Bo, No. 26000 under the B.R. numbering scheme, was completed in 1941 and sent for extended trial in Holland, where the overhead system of electrification is the rule.



B.R. 18000, the first gas-turbine locomotive in Britain, passing Bathampton on a trial run between Paddington and Bristol. Photograph by A. F. Wright.

Britain's First Gas Turbine Locomotive

Considerable interest was aroused a year or two ago when, as announced in the "M.M." at the time, the former G.W.R. ordered two gas-turbine locomotives. The first of these, B.R. No. 18000, has now been delivered and forms the subject of our cover this month. This engine has been supplied by the famous Swiss engineering firm of Brown-Boveri Ltd. It arrived a month or two ago at Harwich, where it was placed on British rails for the first time and later delivered to British Railways, Western Region. We illustrate this engine in the course of its early tests on the Western main line. It is painted black and aluminium.

London Midland Tidings

New locomotives placed in traffic recently included: 2-6-0 class "2" light mixed traffic: Nos. 46435, allocated to 24E, Blackpool; Nos. 46436-9, to 24F, Fleetwood; Nos. 46440, and 46442, 26F, Maudslough; No. 46441, 20H, Lancaster; Nos. 46443-4 37A, Lough; Class "4" 2-6-4T No. 42133, 14B, Kentish Town; No. 42134, 14C, St. Albans; Nos. 42135-6, 20H, Lancaster.

Veteran Webb 2-4-2Ts are still reported at work on local trains, including push-and-pull services, round about Loughington, St. Helens, and elsewhere, often still hauling former L.N.W.R. stock. A few ex-Lancashire and Yorkshire 2-4-2Ts, another famous long-lived type, are also still busy. Some W.R. 0-6-0 pannier tanks have lately been repaired at Derby Works. The 39 Stanier 2-8-0s previously reported as in process of return or transfer from W.D. stock have now all been placed in L.M.R. service. We understand that "7F" 4-6-2 No. 46240 "City of Coventry" was the first to be finished in the latest dark blue British Railways style.

A report recently reached us that rebuilt "Royal Scot" No. 46146 "The Rifle Brigade" in B.R. style green with smoke deflectors, passed through Ludlow on the joint Central Wales line in each direction hauling Shrewsbury-South Wales trains. Many different "SKP" 4-6-0s also are seen there. The largest L.M.R. express engines work

into Shrewsbury (from Crewe) though not usually south thereof.

During the last 12 months, 704 miles of track were completely renewed, using 98,000 tons of new rail with over a million sleepers. This is a record for any one year. Mechanical methods, including prefabrication of complete sections of track in yards beforehand, were often employed. The outstanding effort was the relaying of 1½ miles of main line in the course of a single long day between 4.30 a.m. and 9.0 p.m. by 113 men at Whitmore, south of Crewe.

Arriving new vehicles recently under construction for freight or perishable traffic have been six special tank wagons for conveyance of latex, or liquid rubber, from Liverpool Docks, also

200 new-type fruit vans having improved ventilation and good shelf space for the carriage of fruit and vegetables, particularly from Kewstham to Scotland and the North.

Railway Enterprise in the U.S.A.

The Pennsylvania Railroad announce great improvements in freight services. Some 3,000 larger capacity containers, carried on flat wagons as in this country, have been added to stock to supplement the existing facilities provided by through "box cars," as the large covered goods wagons are called.

The Pennsylvania have in service 180 modern sleeping cars running long distances on East West routes, containing private rooms, suites, separate bedrooms, drawing room compartments for day use and so on; baggage, observation and dining cars have been improved and added to, suitable for employment on long journeys and built up to the large gauge limits allowable in the New World. Diesel-electric locomotive power is being more extensively used.

The Union Pacific Railroad make a similar report, though representatives of the many powerful steam locomotive types for which these great railroads have long been famous are still in the sign.

Track and bridge improvements now permit bigger engines, up to the SKP class, to be used on L.M.R. boat trains into and out of Liverpool (Queenside) on the Mersey waterfront. Previously south-tank engines in pairs were used between Riverside and Edge Hill, where engines were changed.



A youthful enthusiast watches the down "Royal Scot" crossing Dutton Viaduct in charge of No. 46227 "Duchess of Devonshire." Photograph by R. Whitfield.



The giant British air liner "Brahazon" taking-off on a routine test flight. The illustrations to this article are reproduced by courtesy of The Bristol Aeroplane Co., Ltd., Filton.

A Day in the Life of a Flight Test Engineer

By "Pylon"

THE aeroplane to-day is a most complex mechanism. As a result, there are few aircraft upon which it is possible to make thorough tests without carrying Flight Test Engineers. Single-seaters are about the only exception, and here great reliance must be placed upon the films taken of A.O.P.s. (Automatic Observer Panels).

Every test aircraft these days carries a formidable array of test instruments. There are so many that it would be impossible to carry enough human observers to read them all simultaneously. The use of A.O.P.s has therefore spread rapidly since their inception some 15 years ago. But despite the fact that nearly every manoeuvre and flight quantity can be recorded continuously on the film of the A.O.P. cameras, so long as aeroplanes are flown by human beings the human interpretation of the behaviour of the aircraft will be the overriding factor in assessing the success or otherwise of a design.

The pilot, having to look after elevator, aileron, rudder, undercarriage, flaps, propeller, engine, and a good many other controls, has all his work cut out in controlling the aircraft. The Flight Test Engineer can and does assist the pilot in operating some of the controls—for instance undercarriage and flaps—but his primary function is to ensure that all the A.O.P.s, are functioning, keep a close watch on all the instruments, note immediately any sign of failure, and generally act as a mobile "spotter" to watch and report any unusual responses or events.

All flight tests set off from a "Flight-Plan" conference held shortly before the aircraft is due to fly. At this conference a number of people having a design or operational interest in the aircraft will be present. The Chief Test Pilot and Chief Flight Test Engineer will be in attendance so that they will know themselves what is expected of them and so that they can brief others of their crews.

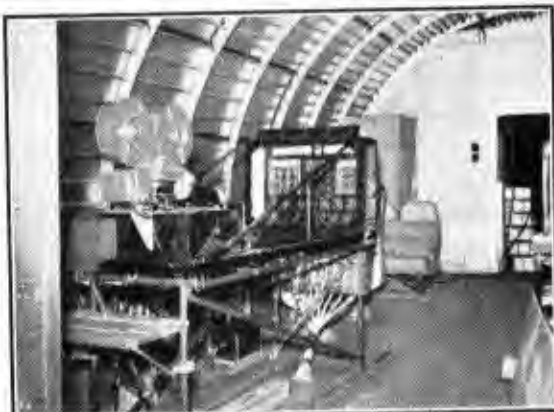
Aircraft of which the prototype has been in existence for some time will normally be engaged on Development Flight work. This is routine stuff, but calls for the same qualities from all concerned as does the flying of a prototype. In the testing of a prototype the first flight is generally the safest and least troublesome. The crew will be given a general idea about how the machine should behave. The Aerodynamic and Design sections have this sort of information laid on from their theoretical work. They can give you a fair idea of take-off speeds, best climb speed, cruising speeds and that Bogeyman—the stalling speed. Also the crew will have been briefed concerning emergency operation of the retractable undercarriage system and similarly for flaps or any other vital component. The crew get to know the aircraft pretty well long before they do their stuff, with the result that when they meet on the runway they are already old friends—or enemies! Yes, it is a remarkable thing that some aircraft radiate a sort of friendliness—others, well!

Long before the first take-off a fairly

comprehensive programme will have been drawn up, with the approval of all concerned. The right sort of cameras will have arrived and some test shots will have been taken and developed to prove that focussing of the cameras on instruments is satisfactory. Some shots of the instrument panels will be taken during engine runs to check whether vibration disturbs the relationship between the camera and the instrument panel.

When the great day arrives any excitement felt by spectators is quite lost on the crew. They have enough checks and operations to perform to occupy them fully. The first period inside the aircraft is spent in detail checks. It is usual to have a previously prepared list of these, and as you see to each one you put a tick against the item. Such checks include "Undercarriage down and locked," "Cooling Gill setting," "Radiator shutter positions," "Hydraulic system pressures and temperatures," to give but a few.

The bigger the aircraft the more engines it will have, and the bigger becomes your check list and the longer must you wait for your take-off. At last, you, the pilot and all crew men have made their checks and you hear over the inter-com, "Zig-zag 33 may I join runway please." Control say you may. So with everything clicking nicely the parking brake comes off and you move slowly forward from dispersal to join that great desert of concrete called the runway.



"Pylon's" station during a test flight, showing an Automatic Observer Panel and its film camera.

First item on the programme is listed as "Brakes." Right. You check that brake pressure is what it is supposed to be, and run up all engines holding the aircraft on the parking brake. You note the engine condition at which the aircraft starts to ease forward against the brakes, then you do the same thing with the toe-brakes. The pilot increases speed gradually until he feels confident to have a good whack down the runway. On the high-speed taxiing runs he must watch that he leaves himself enough room in which to pull up when he throttles back.

All the time, of course, the cameras are humming away, and you will have to keep a watch on a variety of other things—vibrations, noises, smells, all the things which are likely to signify mechanical or electrical trouble of one sort or another.

It would be a remarkable event, if, by now, something or other had not happened to cause the tests to be halted for some minor adjustment. However, with average luck, there should be nothing serious enough to hold up high-speed taxiing. In this programme speeds are reached of a sufficiently high order to get the nose-wheel oil and reach just about the "airborne" speed. After this there will be a bit of a hold-up while, after taxiing



The "Brabazon" I during the flight. The machine in the background is a Bristol "Freighter."

back to dispersal, a few thousand overalld figures engulf the new creation and make sure that it is safe to proceed to stage three—an actual take-off.

Well, all is ready now. We've had a rest, a glass of orange juice and a cigarette, and decided that the next time we climb aboard it will be the real thing. A last check of all equipment needed for the test—camera magazines, recording gear, lenses, ice (for the cold-junctions of the thermo-coupler), set the "gallons-gone" (needed to estimate the amount of fuel used), set all the altimeters to "1013 millibars" (the I.C.A.N. sea-level standard), and in general make sure that all is set. A brief check of inter-comm. and radio, then put on your parachute harness, stow your 'chute in the case provided, climb into your seat (usually a mild form of twentieth-century torture!) and now you're ready to go.

The parking-brake is "off" after take-off power is surging from the engines, and you move off, slowly and a bit clumsily at first. As the propellers take hold you charge faster and faster down the concrete strip until the markers become a blurred uncertainty. The shivering and shaking of the structure dies away and at the same time you hear the co-pilot's triumphant "airborne."

Now it's up to all the crew to get down to it and record every quality and quantity for each fleeting minute of the flight. Undercarriage up now. The warning lights come off as each stage in raising is reached and passed. Now flaps up. Again the lights come on and off just as it says in the book, and all you have to do is to be certain that instruments recording changes of trim while these operations are taking place are functioning. The record of these motions is most valuable.

When settled in straight and level flight the engines are throttled back from their roaring take-off power, and you unstrap yourself to go to all stations and make notes on vibrations, noises, temperatures. You look out at the airscrews, the engine nacelles, and search for leaking oil, or fires, that most frightful of all

incidents. This constant watch goes on until you are ready for the approach to land.

Ready now. Undercarriage down, flaps down, engines to high r.p.m. and low boost, airscrews in fine pitch. All lined up now. Here it comes. A smooth shuddering as the main wheels are "painted" on to the runway in the most impeccable of landings. The nose wheel comes down with a faint thud as the pilot eases the control column forward. Charging down the runway now



The end of the flight. "Brabazon" I coming in to land at Filton.

as the speed of arrival is spilled away. For the first time, the inboard airscrews are reversed to slow you up before you use the brakes. If you put the brakes on right away they would be unnecessarily overrated.

The brakes go on and your progress is rapidly halted. You come to a stop. There is a silence broken only by the mutter of idling motors and the faint whirring of the fans cooling the electric generators, etc. Then suddenly the inter-comm. is alive with excitement as everyone congratulates everyone at the same time and with the same words.

Now of course the work has just begun. All the films which have been taken and all the visual readings you have made have to be reduced to coherent report forms for use in vital investigations. The photographic department will set all hands going so that the films will be available for analysis before the next flight. The films will show whether the desired results have been obtained. Any unsuccessful test will have to be repeated.

Well, that is some idea of a Flight Test Engineer's day. The great thing is that there are so many of them to the year, and each day brings newer and tougher nuts to crack.

The World's Largest Tramway

By M. H. Waller, B.Sc.

LA Société Nationale des Chemins de fer Vicinaux, to give the Vicinal its correct title, is the world's largest tramway and light railway, although it is in one of the smallest countries, Belgium. It operates about 3,000 miles of tramways, and so extensive is the system that it is possible to travel over the whole of Belgium by tramcar, and in certain cases connections are made at frontiers with other tramway systems. There are three types of services, municipal passenger in the larger towns, interurban passenger between towns, and a freight service over the whole country.

The Vicinal was formed in 1884 to promote the construction of a network of tramways on a sound economic basis. It had two main objects, to provide a means of transport in the agricultural areas, which at that time had little or no transport, and to provide tramway systems in the densely populated areas to relieve traffic on the Belgian Railways. It was hoped to balance the loss on the

the State and partly by the various local authorities, though it was to be, and has remained, outside direct State control. By the end of 1894, a decade after its formation, it had obtained the concession of 66 lines, of which 62, measuring 776 miles, were actually in operation. In the same year the S.N.C.V. constructed its first line for electric traction, which was eventually to replace steam traction on all the urban routes and others with heavy traffic. The lines built were operated by the respective local authorities; the S.N.C.V. did not at this time enter into the operation of the services.

By 1904 the system had risen to 1,575 miles, of which 60 miles were operated by electric traction. There were at the same time 319 miles of line under construction, and approval had been granted for a further 235 miles, so the whole network was by now appearing as a well planned entity. An interesting point to note is that although only 3.82 per cent. of the

lines were then operated by electric traction, these lines contributed almost 20 per cent. of the total revenue. This startling result had immediate effects, for in 1913 there were 255 miles of electrified lines out of a total of 2,644 miles, and the former produced 29.64 per cent. of the total revenue.

At the outbreak of the first world war only 495 miles of the original plan remained to be completed, and construction of 99 miles was proceeding. During the war the Belgian

Railways were appropriated by the occupying Germans, with the result that the Vicinal had to carry passenger and freight traffic far heavier than that for which it was designed. This fact, together with complete absence of any maintenance on track or vehicles, led to a very difficult situation, which was aggravated by the devastation caused by the war. In 1918 only 1,158 miles remained workable.



A Vicinal tramcar in front of the Hotel de Ville, Bruges.

rural services with the profit on the urban services. It is to be noted that here was an example of co-ordinated planning, while in countries like Great Britain tramways were being built everywhere with no planning or co-ordination whatsoever.

The S.N.C.V., to use the familiar initials of the system, is a private body, the capital of which was subscribed partly by

Considerable difficulties were encountered after the war, due to the financial instability of the franc, and the exorbitant cost of materials and labour. Thus it was that many of the smaller concerns formed within the framework of the Vicinal were unable to bear the cost of rehabilitation, which amounted in some cases to three times the original cost. One by one these smaller concerns formed within the framework of the Vicinal dropped out, and eventually the Vicinal took over the operation of the whole network, apart from 143 miles operated by several independent companies. In spite of great difficulties the system was back in normal operation by 1922. The British Army had left a considerable number of metre gauge steam locomotives, which helped to solve the locomotive shortage.

In 1927, with the franc finally stabilised, the Vicinal started its programme of modernisation with the completion of the original plan. All steam-operated traffic was to be replaced by electric traction on routes with heavy traffic, and on others by diesel traction. The 294 miles of bus operated lines were to be greatly extended, and fleets of bogie electric tramcars, four-wheel electric tramcars, and diesel four-wheel tramcars were to be built as soon as possible. By 1934 electrification had been completed over 762 route miles and the process is continuing slowly at the present time.

The new four-wheel trams are 33 ft. 11 in. long over the buffers, 7 ft. 2½ in. wide, 10 ft. 6 in. high and weigh 14.4 tons. They are powered by two 68 h.p. motors which give a maximum speed of 40 m.p.h. Pick up is by trolley, pantograph or bow collector, depending on the route. The new bogie cars are 44 ft. long, 7 ft. 2½ in. or 7 ft. 10½ in. wide, 10 ft. 6 in. high, and weigh 18.4 tons. The bogies carry two motors of 62 h.p. each, which give a maximum speed of a little over 46 m.p.h. All the new cars are fitted with air brakes, which are continuous throughout a train. The autorail cars have similar bodies to the four-wheel tramcars, and are fitted

with either General Motors or Gardner Diesel engines of 120-160 h.p. A few bogie autorails were built, mostly as an experimental measure to determine the best mode of drive to the bogies. All these new vehicles were built in the Vicinal workshops.

Modernisation continued, including the



A new bogie car of the Vicinal system in Brussels.

provision of automatic signalling on all single lines, until 1940, when war again stopped activities, though this time the Vicinal suffered comparatively little. In 1945 it emerged in reasonable working order and immediately set about completing its interrupted programme. A new type of bogie tramcar has appeared in the Brussels area, several of which have now been built, including one with resilient wheels and fluorescent lighting. A new type diesel railcar, very similar in appearance to the G.W.R. type of railcar, has appeared at Tongeren depot. There are still a few steam locomotives in use for freight work, but these will be withdrawn in the near future.

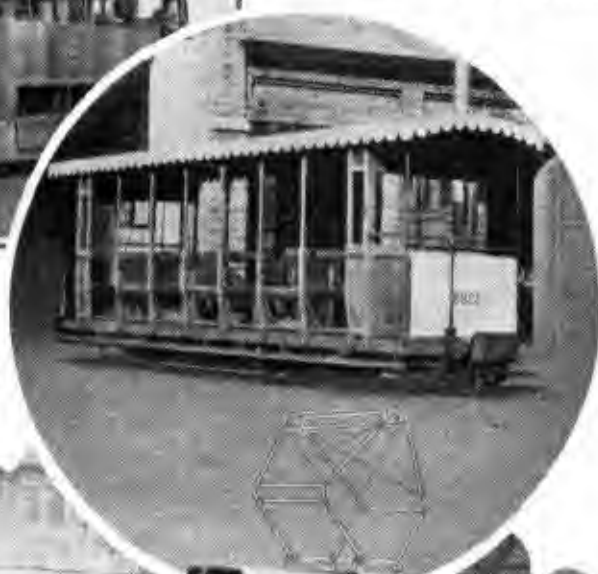
The most important development in the rolling stock has been the acquisition from the United States of a P.C.C. tramcar, No. 10419. This type of car is now built under licence for the Vicinal at Bruges. The cars are fitted with resilient wheels, and are single ended, though provision is made for a set of controls at the rear for reversing. At present this car runs between Ostende and Nieuport. The type has a very high acceleration and a high maximum speed, which makes it ideal for running on the fast reserved right-of-way tracks of the Vicinal.



A bogie motor car and bogie trailer, both standard, of the Vicinal, Belgium's tramway and light railway system, the largest of its kind in the world.



Above is Vicinal steam locomotive No. 408 at Tournai depot. On the right is one of the few remaining open side trailers of the system. Below the P.C.C. car No. 10419, built in the United States, is seen on the line between Ostende and Knokke. This type of car is now being built for the Vicinal at Bruges.



Fighting Forest Fires in Britain

By David Gunston

IN forestry the greatest single factor that has to be reckoned with is the long delay between sowing and planting trees, and harvesting mature ones for timber. Fifty years is a short time in tree growing, and often the men who plant and plant forests never live to see the results of their work brought to maturity. So anything that destroys trees quickly is more than disheartening. The forester's greatest destructive foe is fire. Flames can sweep through woods, wiping out trees that took 30 or 40 years to grow, and in half an hour the work of a lifetime may be lost.

Forest fires threaten every country in the world, Britain not excepted. And with our great new plan for five million acres of new woodlands within the next half century, even the smallest forest fire has assumed great importance. What are our own forest fires like, then, and what is done to combat them?

There are now half a million acres of State forest in Britain, and the area grows monthly. Most of the trees, although by no means all, are softwooded firs, pines, spruces and larches, all of which contain resin and therefore burn very readily. In addition there are large numbers of privately-owned woodlands, many of which are dedicated to the nation for a fixed term of years and are aided by Government grants of money. Fire attacks all these indiscriminately, yet nearly all forest fires begin with the setting alight of gorse, bracken or grass near woods. Occasionally dead leaves or conifer needles inside a wood may be ignited, but generally the fire spreads across the ground and into the woods.

The slightest breeze will fan such flames into roaring infernoes, and a spread of a

complete mile of forest in fourteen minutes has been known. Fires are usually caused by the careless throwing down of still burning cigarette ends, or by leaving picnic fires smouldering instead of heating them quite out. Sometimes in really hot weather bits of broken glass or empty bottles left lying on the ground may set fire to grass and dead leaves by concentration of the Sun's rays through them as with a burning lens.

The worst periods for such fires are February, March, April, May, June and the late summer and early autumn, but conditions vary. Last year, for instance, the hot dry weather started early and finished late. In all wood and heath land the vegetation is dead and inflammable at some time of the year, so the menace of fire is always present somewhere. Last year the Forestry Commission suffered a direct loss of some 470 acres of 750,000 trees, worth £20,000. That damage was done by about 1,000 fires, and the year was a good one.



This notice is a familiar sight in most State forests in Britain. The illustrations to this article are reproduced by courtesy of the Forestry Commission.

In 1948 the Commission's woods were depleted to the extent of £45,000, the number of fires reported being 1,200 and the area burnt nearly 2,000 acres. As young trees are planted out at the rate of 1,500 to the acre, this meant a direct loss of over 2½ million trees, and this does not take into account the large number destroyed in private woodlands.

About £170,000 is now being spent every year on safeguards against woodland fires and in dealing with those that do break out. The comparison between the damage of 1948 and 1949 shows that although the actual number of fires was only slightly fewer last year, the damage done was much smaller. This proves how successful the latest fire-fighting methods employed have been.



A Bren gun carrier in service in a fire-fighting unit.

The authorities now attack fires with military determination. The careless motorist or hiker who throws down a lighted cigarette end into the powdery dry bracken of gorse is met by the trained skill of every one of the Forestry Commission's 13,000 employees, each of whom knows exactly what to do if fire breaks out and, fanned by the wind, threatens to engulf thousands of valuable trees.

The success of forest fire-fighting depends on the speed of attack after detection, so fires must not be allowed to break out unseen. In the larger forests wooden watch-towers are built 65 ft. above the ground. In them spotters keep a close guard on ridges of trees. Other foresters are always ready to give the alarm, and send for the mobile fire-fighting lorries and tenders by field or radio telephone. Large-scale maps are kept ready for plotting out-breaks and directing men to the right spot. Inside the forests, at strategic points, are 35,000-gallon water tanks kept filled and ready. The fire tenders carry miles of hose, with automatic and hand pumps with nozzles and sprays, and in some particularly vulnerable areas mobile dams are used. These are large lorries fitted with water tanks as well as pumps.

In areas where rough heaths surround the woods, converted Bren-gun carriers from the Army may be used with success, and the fire rangers find them excellent for moving swiftly to the attack.

Birch brooms set up ready for use are always at hand all over State forests, and they form the best means of individual fire-fighting. In an area where a fire is spreading with the wind, everyone near by should help by beating out the flames directly downward with these brooms or with green branches hurriedly cut from unharmed trees. Police and A.A. and R.A.C. scouts all give help to foresters on such occasions, but hikers, campers and passers-by can and always should lend a hand.

Fires are always attacked from the flanks, an effort being made to drive the burning area inward to a tapering point or close in on a road or pathway. Water is not always available unless static tanks are sited near by, but wetted sacks and even buckets of water are better than just watching the woods burn. Long-handled shovels also help to beat out the flames, but sparks must not be driven on to untouched bracken or leaves by too vigorous banging. Where the fire has got a hold and the heat is too intense to work in twos and threes, concerted rushes of 20 or 30 people, backed up if possible by hoses from the mobile fire tenders, help to quell the flames and prevent further advance. Smouldering peat and bracken still has to be watched for a day or two after extinguishing to ensure that it does. (Continued on page 238)



Ten years for young trees to grow 10 ft. high—and in much less than 10 minutes they are destroyed by fire.

Photography

Camera Work in May

By John J. Curtis, A.R.P.S.

WHAT an enormous number of films are exposed on pets, especially cats and dogs, and how few are really successful! The usual reason for this seems to be that the photographer makes little effort to get the subject in a "live" pose. A cat asleep in mother's lap, or a dog curled up on the hearth rug, can never make an interesting photograph. It may be a natural position, but compare it with feline alert and looking up at his master and pleading to be taken for a run, or paws anxiously watching its mistress preparing its plate of food.

At a Zoo it is not uncommon to find that some of the inmates appear to recognise a camera and seem to pose. I remember one penguin actually strutted across his enclosure, seemingly to get closer to me.



Monkey at Heysham Zoo. Photograph by R. Wrigley, Clitheroe.

Bears, lions and penguins are splendid subjects. Do not be in a hurry to expose on a lion or tiger if he is dozing; in a few moments he may be disturbed and on his feet or with head raised and excitedly looking out of the cage at something a few yards away that has attracted his attention; then is the time to capture a real natural pose or expression. The photograph by P. Duffy reproduced on this page is an excellent example. A piece of bun will persuade a bear to take up almost any position you want, and even the smell of cucumber will attract all the monkeys to your side of the cage.

Feeding time is, of course the best for seals and sea-lions, and a bag of football held in the hand is a strong inducement to the larger beasts, such as elephants, to stand for their portraits.



Pedigree Cocker Spaniel. Photograph by John J. Curtis, A.R.P.S.

You will find that a fast film is preferable because all animals are inclined to be restive, and if you have carefully selected your position as regards lighting and background beforehand, you will be able to make the exposure without any delay.

Get friendly with the keepers. They are fine fellows and love their charges, and are very ready to help anyone who desires to make a pictorial record of them.



A fine lion photograph taken at Dublin Zoo by P. Duffy, Portlanna, Eire.

Using the Meccano Gears Outfit "A"

A Simple Meccanograph for Outfit No. 4

ONE of the most popular Meccano models is the Meccanograph, which was first introduced many years ago. The Meccanograph is a form of designing machine which, when set in motion, produces automatically hundreds of beautiful pattern drawings. Since the original machine appeared many modified versions of it have been built, some of which are more complicated and capable of producing a larger variety of designs, while others are of a more simple type. One of the latter kind is the model shown in Fig. 1, which can be built from Outfit No. 4, with the addition of a Gears Outfit "A."

The frame of the model is built by bolting 12½" Strips to 5½" x 2½" Flanged Plate 1 and to two 5½" Strips bolted upward from the Flanged Plate. The

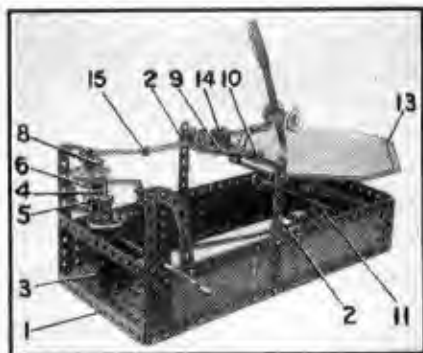


Fig. 1. A simple Meccanograph which produces a variety of interesting and beautiful designs. It can be built with a No. 4 Outfit and a Gears Outfit "A."

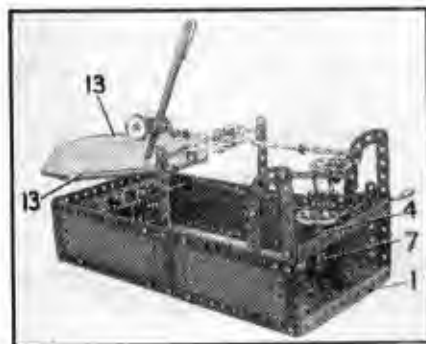


Fig. 2. Another view of the Meccanograph.

space between the 12½" Strips is filled in both sides by 5½" x 2½", 4½" x 2½" and 2½" x 2½" Flexible Plates. The end is filled by two 5½" x 1½" Flexible Plates strengthened by two 5½" Strips. A 2½" x 1½" and a 1½" x 1½" Double Angle Strip bolted to 5½" Strips 2 are connected by a Semi-Circular Plate.

The mechanism that produces the design is driven from a Crank Handle, which is mounted to a 3½" Strip and in the 2½" x 1½" Flexible Plate 3. A 1½" Pinion on the Crank Handle meshes with a 1½" Contrate Wheel loose on the 5½" Rod 4. This Rod passes through a Double Bracket 7 bolted to the Flanged Plate 3. The Bolt that holds it also locks the Rod and prevents it from turning. Four Washers stop the Contrate from the Flanged Plate. A 1½" Pinion 5 on a 2½" Rod meshes with a second 1½" Pinion inside a frame made from two 2½" x 1½" Double Angle Strips connected by Fishplates.

The Rod is so parallel in the Contrate with sufficient space left for it to clear the Flanged Plate 3, and it carries a Bush Wheel at the other end. Fishplate 8 is bolted to the Bush Wheel but is spaced from it by two Washers.

A 3" Sprocket Wheel on the Crank Handle is connected by a length of Chain to a similar part on a compound rod 11. This consists of a 4" and a 2" Rod joined by a Rod Connector, and it also carries a Worm Gear. The Worm engages with a 57-tooth Gear Wheel on a 3½" Rod, which is mounted in a

5½" Strip, and in a compound Strip 12 consisting of two 2½" x 1½" Double Angle Strips joined by a 2½" Strip.

The table on which the paper to take the design is placed is made from a piece of stiff cardboard about 6½" square and has a 3" Pulley bolted to its centre. The belts holding the Pulley are sunk below the level of the cardboard and a piece of smooth paper is pasted over the surface of the board. Paper on to which the design is produced is held on the board by two rubber bands 13.

The pen arm consists of a 5½" and a 2½" Strip, and is rigidly attached to Fishplate 8. It passes through a Double Bracket, which is bolted to a 2½" Strip 9 spaced from the 2½" x 1½" Double Angle Strip by a 1" long Pulley 10, as shown in Fig. 1. A ball typewriting pen is held between a Stopped Bent Strip and attached to the Fishplate on the end of the pen arm by an Angle Bracket. The Stopped Bent Strip may be tightened on the pen by locking the 1" Pulleys together on the Rod. (Continued on page 238)

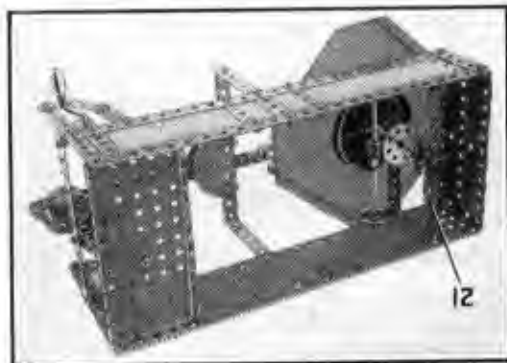


Fig. 3. The Meccanograph seen from underneath.

Among the Model-Builders

By "Spanner"

Another Differential Gear for Car Chassis

Differential gears of many different types have been described from time to time in the "M.M." and still another example is shown in Fig. 1. The mechanism is mounted in a framework consisting of two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Double Angle Strips joined together by $2\frac{1}{4}''$ Strips. Three Double Bent Strips are bolted to the frame in the position shown, to form reinforced bearings for the rods of the gear.

The differential gear is built up as follows. The drive from the car engine is taken from Rod A, on the end of which

which is required to operate without attention for long periods. The mechanism will also be found useful in many instances where a model is required to perform a definite sequence of operations, and has the advantage that the period between each reversal of the mechanism can be adjusted as desired.

The Motor is suitably mounted on a base-plate and its sideplates are extended by $3'' \times 1\frac{1}{2}''$ Flat Plates. A Worm on the armature shaft meshes with a 57-teeth Gear 1 fixed on a Rod journalled in a $2\frac{1}{2}'' \times 1''$ Double Angle Strip. A $\frac{1}{2}''$ Bevel Gear on this Rod meshes with a similar

Gear 2 on a horizontal $2\frac{1}{2}''$ Rod, which carries also on its other end a $\frac{1}{2}''$ Pinion. The Pinion meshes with a 57-teeth Gear on a 3" Rod, which carries also a $\frac{1}{2}''$ Sprocket Wheel 3 that is connected by Chain to a $\frac{1}{2}''$ Sprocket Wheel fastened on a $3\frac{1}{2}''$ Screwed Rod 4. Bearings for the Screwed Rod, which carries two Collars placed as shown, are provided by two Threaded Couplings fixed to the base-plate, and an End Bearing on it is connected by Springs 5 to a $\frac{1}{2}''$ Bolt lock-nutted to a $1\frac{1}{2}''$ Strip that is bolted to the centre arm of the reversing switch of the Motor. The drive to the model can be taken from

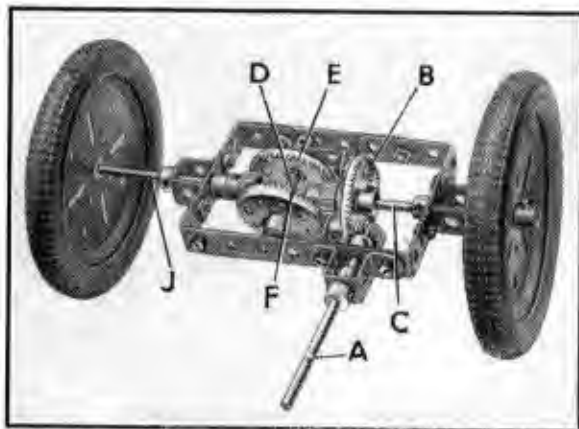


Fig. 1. One of the many methods of constructing differential gear in Meccano.

is a $\frac{1}{2}''$ Pinion that meshes with a $1\frac{1}{2}''$ Contrate Wheel B on Rod C. Two $1 \times \frac{1}{2}''$ Angle Brackets are spaced by Collars and bolted to Contrate Wheel B. A 2" Rod D is placed through the end holes of the $1 \times \frac{1}{2}''$ Angle Brackets and through Contrate Wheels E and F. These mesh with two $\frac{1}{2}''$ Pinions on the ends of Rods C and J, which form the halves of the back axle of the car.

Automatic Reversing for E20R Electric Motor

Fig. 3 shows a novel type of automatic reversing movement that can be fitted to the reversing lever of an E20R Electric Motor. The Motor could then be used in a model such as a transporter bridge,

any of the intermediate shafts journalled in the Motor sideplates.

When the Motor is set in operation the End Bearing traverses the Screwed Rod and extends the Springs. As the End Bearing nears the end of its travel the pull of the Springs overcomes the friction of the reverse lever and it snaps over, the Motor being immediately reversed. The End Bearing then travels to the opposite end of the Screwed Rod.

For efficient operation all the rotating shafts and screw mechanisms should be well lubricated.

A Fine Group of Models

Brian Singleton, Bournemouth, has recently completed a group of interesting



Fig. 2. Brian Singleton, Bournemouth, and his group of wire rope making and covering machines.

models representing machines used in the making of wire rope and wire covering. The models together with the builder, are illustrated on this page, and they are an excellent testimonial to this young model-builder's technical knowledge and ability.

A Novel Use for Spring Clips

G. Burns, Warragul, Australia, recently came across a problem very often met with in certain types of models, that of fastening a hoisting Cord securely to a Rod or Crank Handle. A Cord Anchoring Spring is of course the best solution to the difficulty, but very often a complicated model has several hoisting Cords and sufficient Anchoring Springs are not available. Burns overcame the difficulty in a neat and effective way by making use of Spring Clips. He placed about $\frac{1}{2}$ " of the Cord along the Rod and pressed two or three Spring Clips over the Cord and Rod. The Cord was firmly gripped by the Spring Clips and wound neatly along the Rod when it was turned.

MODEL-BUILDING COMPETITION RESULTS

October General Contest (Overseas Section)

The Overseas Section of the October General Model-building Competition attracted a fine crop of entries from all parts of the world, and among them were several of a most interesting type. Prize-winners have already been notified of their success, and the list of awards is as follows—First Prize, £3/3/-: P. B. Henriksen, Bethlehem, Orange Free State. Second Prize, £2/2/-: G. Burns, Warragul, Australia. Third Prize, £1/1/-: D. R.

Heoramanek, Bombay 7. Five Prizes each of 10/6: R. Partridge, Lilongwe, Nyasaland; M. Johnston, Concord, Ontario; S. Reid, Quebec; J. Lowndes-Yates, Calgary, Canada; H. Kooy, Rotterdam.

Five Prizes each of 5/-: Yacoub I. Bahemia, Port Louis, Mauritius; E. Flores, Birkirkara, Malta; L. Finner, Cork; J. M. Ferguson, Blackrock, Eire; J. Brown, Sydney.

An imposing model of the aircraft carrier "Implacable," which I am unfortunately not able to illustrate, won the First Prize for its builder P. B. Henriksen.

This model is a mass of finely constructed detail, which includes four very realistic fighter aircraft, one of which has folding wings. The aircraft are about 5" long, while the carrier itself has a length of 7 ft. 1½ in. Apart from a full complement of armament, interesting details of the ship include two working lifts, cranes, and three radar aerials of different types. All of these, in conjunction with the finely flared hull, combine to form a very attractive and realistic model.

An unusually attractive entry was sent by Graham Burns, Warragul, Australia. His model was a street planer of a type used for smoothing down rough asphalt roads. The machine carries fuel oil burners which soften the asphalt, and planing blades that scrape off the high spots as the machine travels along.

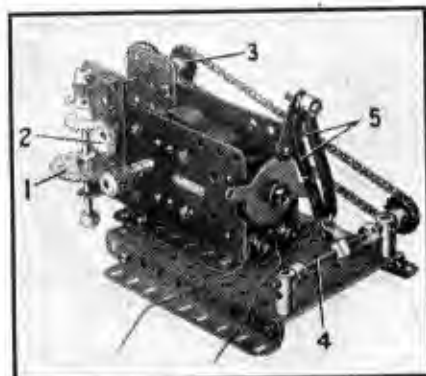


Fig. 3. A novel automatic reversing mechanism for an E26R type Electric Motor.

New Meccano Models

Bagatelle Table—Drilling Machine

THE bagatelle table that forms one of our two new models this month is shown in Figs. 1 and 2. It is very easy to build and requires only a small collection of parts for its construction.

The frame of the table consists of four long compound girders, which consist of $12\frac{1}{2}$ " and $5\frac{1}{2}$ " Angle Girders overlapped. They are connected at each end by $5\frac{1}{2}$ " Angle Girders and $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates. The slanting position of the table is produced by two Handrail Supports 9 attached to one end of the model.

The table is made from $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates and $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates. Various sizes of Strips are arranged to provide five

raised the balls roll down a chute and into a compartment so as to be ready for firing again. This chute is built from two $7\frac{1}{2}$ " Angle Girders and two $5\frac{1}{2}$ " Angle Girders, and is played by three $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Plate. The firing plunger, a 5" Rod, is journaled in a $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Double Angle Strip 7 and carries three Compression Springs 8 and a Coupling at each end.

Parts required to build Bagatelle Gunner: 8 of No. 2; 1 of No. 2a; 1 of No. 4; 3 of No. 5; 18 of No. 6; 2 of No. 6a; 8 of No. 8; 2 of No. 8b; 14 of No. 9; 1 of No. 9c; 3 of No. 9d; 1 of No. 9e; 1 of No. 10; 1 of No. 11; 12 of No. 12; 3 of No. 15; 14 of No. 37; 2 of No. 37a; 20 of No. 38; 1 of No. 48; 1 of No. 48d; 5 of No. 52; 1 of No. 53a; 2 of No. 62; 1 of No. 72; 1 of No. 111a; 1 of No. 114; 4 of No. 120b; 2 of No. 136; 4 of No. 188; 4 of No. 189; 10 of No. 192.

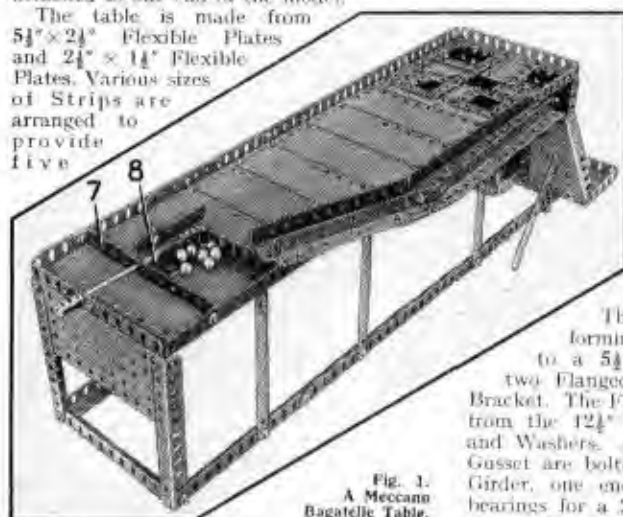


Fig. 1.
A Meccano
Bagatelle Table.

square holes in the table as shown. When the balls pass through these holes they fall on to a slide made by attaching two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates 1 to the Flanged Plate at the end of the model and then connecting these to the table by a second Flanged Plate 2. Two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates 3 are attached at one end to the Plates 1 by a Double Bracket 4 and to the other by a $1\frac{1}{2}$ " \times $1\frac{1}{2}$ " Double Angle Strip. They are edged by $5\frac{1}{2}$ " Angle Girders 5, and these and 2" Strips 6 attached to the Plates by Angle Brackets form guides for the balls.

The balls fall into a tray made by attaching a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flat Plate to a Flanged Sector Plate, and bolting $2\frac{1}{2}$ " Angle Girders round the edge. The tray is attached by a Hinge 10 and when it is

The other new model this month is the vertical drilling machine shown in Fig. 3.

The two $12\frac{1}{2}$ " Angle Girders forming the column are attached to a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate by two Flanged Brackets and an Angle Bracket. The Flanged Brackets are spaced from the $12\frac{1}{2}$ " Angle Girders by Collars and Washers. A $5\frac{1}{2}$ " Strip and a Corner Gasket are bolted across the top of each Girder, one end of the Strip providing bearings for a $2\frac{1}{2}$ " Rod on which two 1" loose Pulleys are placed. A $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Double Angle Strip 1 is attached to the Angle Girders and is braced by two 3" Strips bolted to the Double Angle Strip by a Double Bracket. A $6\frac{1}{2}$ " Rod 2 is locked in a Crank 3 and in a large Fork Piece fixed to a 2" Strip 4 and a $1\frac{1}{2}$ " Strip. The drilling table is a Face Plate attached to Rod 2 by a Crank which also carries a Threaded Pin.

The drilling spindle assembly is constructed from a $4\frac{1}{2}$ " and a $3\frac{1}{2}$ " Rod, each of which carries two Flanged Wheels. Two $3\frac{1}{2}$ " Rods are held firmly in the lower set of Flanged Wheels by Collars, but are free to move in the others. The lower Rod carries three Compression Springs. A $3\frac{1}{2}$ " Strip forming the feed lever is lock nutted to the 2" Strip 4 and held

loosely on a Collar 5, which is free on the Rod. The drilling head is made by locking a Centre Fork in a Coupling 6 and is brought into the drilling position by the feed lever. When the lever is released the drill is raised from the work by the action of the Springs.

The Crank Handle by which the machine is operated is journaled in the Flat Trunnions and carries a 1" Pulley, which drives the drilling spindle by a continuous belt of Cord.

Parts required to build Vertical Drilling Machine: 2 of No. 2; 1 of No. 3; 2 of No. 4; 1 of No. 6; 1 of No. 6a; 2 of No. 8; 2 of No. 9; 1 of No. 11; 1 of No. 12; 1 of No. 14; 1 of No. 15; 2 of No. 16; 1 of No. 17; 1 of No. 19; 4 of No. 20; 2 of No. 22; 2 of No. 25a; 2 of No. 35; 43 of No. 37; 35 of No. 37a; 11 of No. 38; 1 of No. 40; 1 of No. 48a; 1 of No. 52; 16 of No. 59; 2 of No. 62; 1 of No. 68; 1 of No. 68; 2 of No. 108;

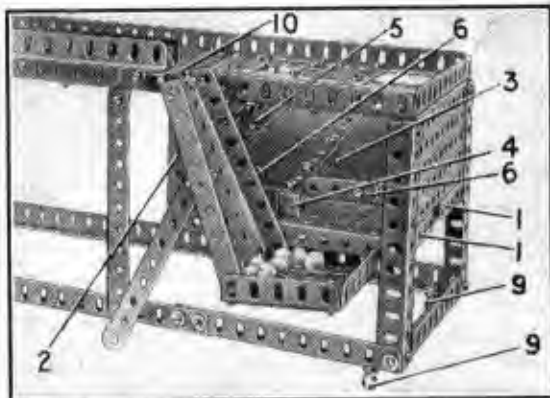


Fig. 2. Rear end of the Table showing the scoring traps and ball delivery chute.

1 of No. 109; 4 of No. 111a; 1 of No. 115; 2 of No. 116; 3 of No. 120b; 2 of No. 120a; 1 of No. 130; 1 of No. 139a.

Fine Prizes for Meccano Models

Model-builders should not miss the opportunity of winning one of the fine prizes offered in the General Model-Building Contest first announced in last month's "M.M." All that is necessary to take part in this competition is to build a Meccano model. There are no restrictions regarding the size or subjects of models, and every reader is eligible to compete no matter what his age may be. The only condition is that the model must be the competitor's own unaided work.

After the model is built the next job is to obtain a suitable illustration of it. This should be a photograph preferably, but a sketch will do quite well. The competitor must write his age, name and address on the back of the illustration and enclose it, together with a brief description of the model, in an envelope addressed "April General Model-Building Contest, Meccano Ltd., Plains Road, Liverpool 15."

Entries will be grouped into two Sections, one for competitors living in the British Isles and the other for Overseas competitors. Those from competitors in the British Isles may be sent in at any time up to 31st May, 1950. Overseas entries from readers will be accepted until 30th September, 1950.

The following prizes will be awarded in each section of the Contest. First, Cheque for £2 2s.; Second, Cheque for £1 1s.; Third, £10, for 10 6. There will be also five awards of 5s. each and Certificates of Merit.

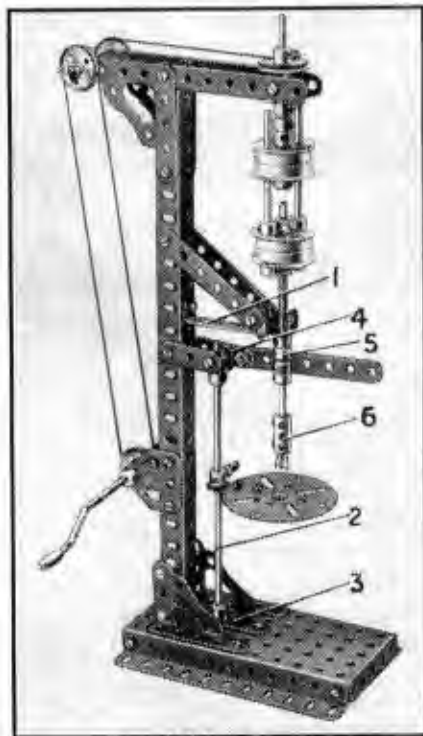


Fig. 3. Drilling Machine.



Club and Branch News



WITH THE SECRETARY

EXHIBITION BY-PRODUCTS

I have been interested to see how many Clubs have brought the Winter Sessions to an end with a good Exhibition. In every case the display made has been successful in two special directions, quite apart from, and beyond the merits of the display itself. On the one hand enthusiasm and energy have been maintained among members right to the end of the indoor period. With the prospect of an Exhibition in front of them, at which their parents and friends generally would be present, they have kept up their keenness and have continued to build models of good standard and to do all they could to ensure that these were worthily displayed.

The second way in which these Exhibitions have been successful is in demonstrating the value of Meccano Club life to many who have known little about it, and have required a display of real merit to convince them of the advantages to be derived from Club membership. Every new friend made in this way by a Club is an insurance against lack of success in the months and years to come, especially if he becomes an active official or supporter, and not just a well-wisher. The moral of this is—Encourage interested visitors, whatever their ages, to come often and not just on full dress occasions.

There is just one other point to be observed. Members of every Club that has held a successful Exhibition wound up the indoor sessions with a feeling of satisfaction. They are now ready to take part in the summer programme, which in some Clubs has already begun, and they will do this with greater pleasure than if there had been no landmark of this kind in their Club's history.

PROPOSED CLUBS

BIRMINGHAM—Mrs. P. C. Field, 85, Barton Lodge Road, Hall Green, Birmingham 28.

BUENOS AIRES—Mr. E. Ketzelnim, Centenario 535, P'iso, Buenos Aires, Argentina.

CLUB NOTES

BURY GRAMMAR SCHOOL M.C.—The Model-building Section has enjoyed excellent competitions, and in which have been realistic and enterprising. A Model Aircraft Section has been formed. Its programme has included talks on model aircraft and power units for them, with a Quiz, and a demonstration of actual flight. Club roll, 32. *Secretary*: J. C. Hart. "Hildrop." 2, Helgrave Road, He Crumpsall, Manchester 8.

TORNTON GRAMMAR SCHOOL M.C.—Excellent work has continued, and members have enjoyed two Film Shows. A Stamp Club, a Spotters' Section and a Magic Circle have been formed; the Magic Circle is to give a show to the school during the summer. Club roll, 24. *Secretary*: A. J. Hird, 28, Morlin Grove, Lower Granade, Bradford.

WHITCHURCH (GLAM.) M.C.—A gantry crane and a large mobile crane are being constructed as group models. They are providing interesting work and excellent progress is being made. Before games,

including Chess, also have been enjoyed. Club roll, 7. *Secretary*: F. G. Butler, 6, Mervey Road, Whitchurch. **HORNBY GRAMMAR SCHOOL M.C.**—Great interest was shown in the Grand Prix de Bordenne, in which model cars constructed by members with various types of Meccano motor competed against each other, in a realistic miniature of actual Grand Prix races. Other meetings were devoted to aircraft topics, including a talk on the Vickers-Armstrong and Supermarine Companies between the wars. Club roll, 20. *Secretary*: S. Wood, 20, Harold Street, Queenborough, Kent.

AUSTRALIA

MELBOURNE M.C.—The usual programme has been followed, including the operation of the Branch



The Barker's Butts County Secondary School M.C., Leader, Mr. F. Batten, was affiliated with the Guild in June 1944. Its meetings have been notable for the excellent standard of model-building which has been in evidence at the Club's Annual Exhibitions. Hornby and Hornby-Dublo Train operation also are carried on, and our illustration, reproduced by courtesy of the "Coventry Telegraph," shows part of the display at the Club's recent Exhibition.

Hornby Railway, and Film Shows also have been given. An interesting event was the demonstration of a group of sound records, reproducing the noises of railway trains, etc., contributed by one of the members. *Chairman and Secretary*: Mr. L. Isom, 8, Hayes Street, Northcote N.38, Victoria.

BRANCH NEWS

RYDAL SCHOOL (LANCASH. BAY)—The last term brought many new members. A successful Exhibition has been held, at which micromodels and photographs by members were on view in addition to the Branch layout. Lectures have been given on railway subjects. A Museum and Magazine have been started. *Secretary*: B. L. Paton, "Barbarians," Rydal School, Colwyn Bay.

BENNINGTON—An excellent display was made at *Open Night*. On the Bench Hornby Railway trains were run and timetables worked out. A fleet of Dinky Toys Buses now converts two villages on the Branch layout. *Secretary*: B. Sheppard, "Newtown," 11, Cherry Hill Gardens, Waddon, Croydon, Surrey.

Hornby Locomotive Working

THERE is little doubt that in the running of a Hornby Railway a great deal of the operator's interest is centred on the engine. The keen Hornby Train owner keeps his engine clean both inside

can consist of making sure that the engine is clean, with no dust on the oily working parts, and that the correct headlamp indication is in use. Details of the standard headlamp code appear on page 12 of the H.R.C. Booklet. The engine can be wound ready to leave the engine siding, or shed, if we have one. Following our usual practice we wind the engine only sufficiently to bring it up to its train, which will be standing either in the station or in a siding. This will involve some patience, but the time spent in experiments to ensure correct winding is worth while.

After attaching the engine to the train, the next step is to wind the engine in readiness for the run. After the "right away" is given, the brake is released and the train sets off on its journey. We then carry on with the running programme, which can be varied

if we have both passenger and goods vehicles. Our engine can put in some useful shunting work in between actual main line runs.

When the day's running comes to a close the engine must return to the depot. If we have a Turntable, we may need to run the engine on to this and turn it in readiness for its next period of running.

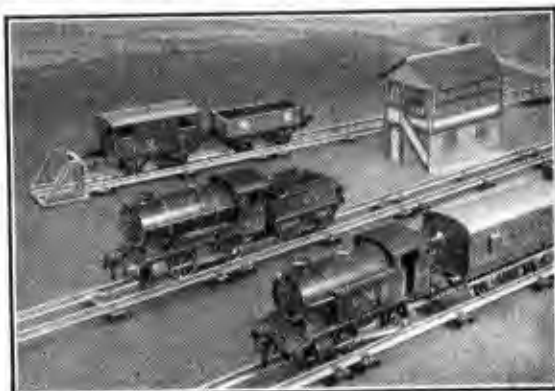


After the day's work. A Hornby No. 501 Locomotive and tender on the No. 2 Turntable of the Hornby range.

and out, as described in the "M.M." last month. In addition to this routine attention, other points connected with the running of engines should be observed to make sure of good fun when the railway is operated.

On a one-engine line both passenger and goods trains will have to be run by the same engine. Perhaps on a simple layout each type of train will be run in turn in order to vary the programme. But if there is more than one engine things naturally become more interesting; one engine may be reserved for goods work and another for passenger duties according to the preference of the owner. Local trains of either kind will no doubt be handled by a tank engine, such as the Hornby No. 101 Tank, while the more important jobs can be allocated to a tender engine such as the Hornby No. 501 Locomotive.

As a little oil lasts quite a long time there is no real need to "oil round" the engines each time we have our railway working. So a brief preparation



A Hornby No. 101 Tank at work on a stopping passenger train. The other engine, a No. 501, is running "light," as shown by the position of the headlamp.



Planning Ahead with Hornby-Dublo

By Francis Walker

TWO important things to bear in mind when gradually enlarging a Hornby-Dublo layout are first, that the layout must at all times be complete for working purposes; and second, that it must be capable of extension without having to scrap existing plans. These considerations are not always easy to reconcile, so these notes on the layout we have developed may be of interest and perhaps practical value to "M.M." readers.

The system started with a Hornby-Dublo L.M.S. Passenger Set. Later on an L.M.S. Goods Set arrived; then the addition of two Points for a crossover and a third set of Points for a siding permitted the beginnings of reasonably varied operations. Isolating Rails and Switches were introduced to protect the siding and crossover. Next an extra set of Points made the siding into a loop, and the inner and middle circuits of the present system, seen in the diagram on the next page, became crystallised.

Later still an L.N.E.R. Passenger Set was acquired, and so a third circuit was added. It will be seen that by making the acquisition of each Locomotive and train coincide with that of a further Controller and power circuit, one can always ensure a system capable of accommodating all trains running at once. This may seem obvious, but otherwise a well-meant gift may involve a system which always requires

at least one locomotive to be at a standstill. This is not unrealistic, but it can be rather tantalising when one's resources are limited.

The principles involving the addition of further Points, Isolating Rails, Buffer Stops, and so on are all governed by the same underlying idea. A single set of Points leading to a siding will also involve a Buffer Stop and an Isolating Rail. Two Points of the same "hand" will double these requirements, or the Points can be used to form a crossover to join two circuits, while two unlike Points, that is one Right Hand and one Left Hand, also can provide two separate sidings needing two Isolating Rails and two Buffer Stops.

Two unlike Points can give a loop, which needs two Isolating Rails with only one of them connected to a switch. Alternatively a return loop can be provided joining two circuits, but arranged as shown

towards the left hand top end of the diagram, to transfer a train from one circuit going clockwise to the other going anti-clockwise. This is a really useful arrangement to turn a locomotive or even to turn a whole train, the crossover returning it to the original inner circuit. The centre rail clips in the middle of the crossover need separating by paper, as also those at one end of the loop just mentioned.

Again, in extending marshalling yards, neatness, space and realism all require

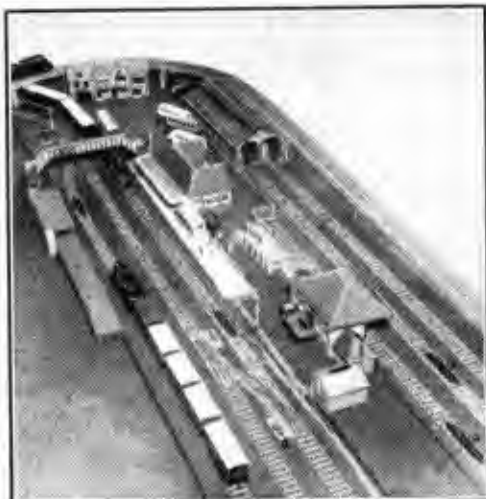
The station and other buildings on the layout described in this article. The incline road appears in the background behind the engine shed.

the sidings to be parallel if possible. So each set of Points requires a Curved Half Rail to bring all the sidings parallel to the main line. A Straight Quarter Rail at least is needed between each set of Points to afford space for the lever baseplates if several Points of the same "hand" leading to the sidings are taken off the same track.

When planning crossovers it helps to have them either all left-hand or all right-hand, and placed if possible to give a through run from the outer to the innermost circuit, such as the left-hand crossover in the diagram. Otherwise trains have to reverse along the middle "circle," or run over a portion of it. Our next aim is to add corresponding right-hand crossovers to cover movements in the opposite direction.

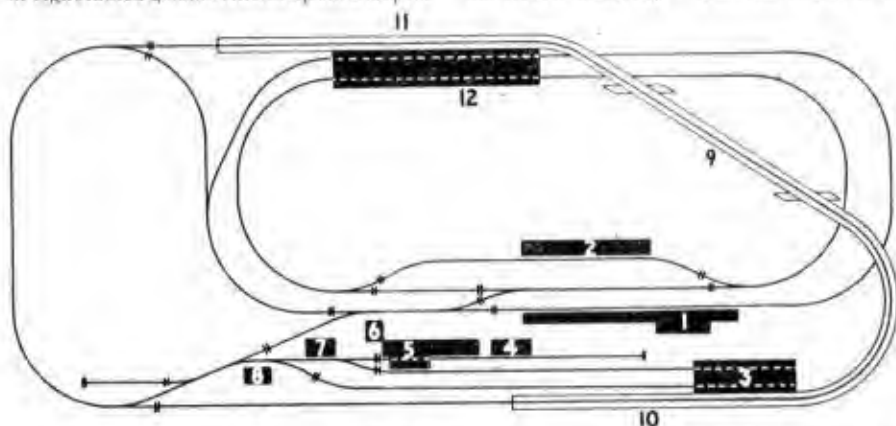
As regards wiring, on our layout we have each main circuit governed by a Controller which also controls the sidings, loops and so on running off that circle. For example, our sidings are fed from the Controller for the outer circle; the passing loop is fed from the Controller for the innermost circle.

To add variety and to save space a two-level track has many advantages, and Hornby-Dublo Locomotives in good trim can easily cope with the gradients. A slope of 1 in 30 can be tackled by trains. We have the "*Duchess of Atholl*" and "*Sir Nigel Gresley*" regularly taking four coaches or eight mixed goods vehicles up such slopes.



An aerial view of the station and its yard showing the realistic and attractive arrangement of this part of the system.

The added fun of manipulating the Controller for uphill or downhill trains is fascinating. Whereas normally the Controller handle might have to be say, two-thirds round to full speed for running on the level, if you "open out" to full speed at the right moment the trains sail up. Downhill one throttles right down, and gradually "opens up" as the train comes on to the flat. We can even take "*Sir Nigel*" off from a standing. (Continued on page 235)



1. Up platform.
2. Down platform.
3. Engine shed.
4. Cattle pen

5. Goods depot.
6. Coal Merchant's Office.
7. Signal box.
8. Water tank.

9. Girder bridge
- 10, 11. Incline approaches to bridge.
12. Tunnel.

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Stamp Collecting

Vatican City Pictorials

By F. Riley, B.Sc.

THE issue of four stamps to mark the inauguration of the 1950 Holy Year is an interesting reminder of the position of the Vatican City in the stamp world. The association of stamps with the papacy began almost 100 years ago, under Pius IX, but the issues concerned were those of the Roman States, and were superseded in 1870 by the stamps of the kingdom of Italy.

Vatican City stamps first appeared in 1929, and since that time a very interesting series of commemorative pictorials has appeared. Almost all of these can



be obtained with a comparatively small outlay, and many youthful collectors will find that they provide an excellent opportunity of making a good special display. They are colourful and lend themselves particularly well to good arrangement and writing up.

The design of the stamps of the old Roman States showed the Papal Tiara and St. Peter's Keys. These provided also the theme of the Vatican City stamps of 1929, and they appeared on a further issue in 1933, while the keys are seen also in the denominations of several issues.

Scenes in Rome have provided the designs for many of the issues of the 24 years of Vatican City stamp

history. These include the Basilica of St. Peter's, the Vatican Gardens, Vatican Palace, and a representation of the Vatican City on stamps of the 1933 issue. The story of the Catholic Church also has provided inspiration for many commemorative issues, and a good example of what can be done along these lines is the set that appeared in 1946 to mark the fourth centenary of the opening of the Council of Trent. This commemorative

issue included 12 stamps, with two express letter stamps, and all bore portrait designs except the lowest value of 5 c., which showed Trent Cathedral. An interesting feature of this issue is that two of the church dignitaries portrayed were English. One was

Reginald Pole, who was Archbishop of Canterbury under Queen Mary, and the other John Fisher, Bishop of Rochester, who was beheaded in the reign of Henry VIII. The stamp showing Cardinal Pole's portrait is reproduced here. In the original it is sepia and blue in colour.

A Holy Year clearly is a suitable occasion for the appearance of special commemorative stamps. When such an issue was first possible, in 1933, four stamps in two forms designs appeared, but to celebrate the present Holy Year eight attractive pictorial stamps in four designs have been issued. The lowest value, in red-brown with a brown frame, reproduces a medieval painting showing Christ giving the keys to St. Peter, and the design is repeated on the 20 L. value in red-brown with a green frame. The design of the 50 L. value, black and brown, and of the 25 L. stamp, bright blue and brown, shows a model of the Vatican City, with St. Peter's in the foreground.

The 8 L. and 30 L. design is of special interest, as its subject is derived from the first Jubilee or Holy Year. This was proclaimed in 1300 by Boniface VIII, and during this year pilgrims crowded to Rome from all parts of Europe. The two stamps reproducing a medieval painting showing Boniface VIII making the actual proclamation. Other Jubilees followed, first at intervals of 80 years and then more frequently, and the present Holy Year is the 25th of the series.

The most distinctive ceremonies of a Holy Year are the opening and closing of a holy door in each of four Basilicas of Rome. One of these is St. Peter's, and the Holy Door of this great Cathedral is opened by the Pope himself. Normally the door, the nearest to the Vatican, is bricked up. On Christmas Eve of 1949 it was opened up again with due ceremony. The Pope advanced to the door, and knelted three with a silver hammer, after which masons demolished the wall so that the great procession could pass through into St. Peter's. Impressive ceremonies mark the closing of the door at the end of the Holy Year. With a silver-tilt trowel the Pope lays mortar on the threshold. Medals are thrown on this, and three square bricks are placed on them after which the walling up is completed.

On the 10 L. stamp, in deep blue and green, the Pope is seen striking the door with the silver hammer, and the design is repeated on the 30 L. stamp.





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(DEPT. M)

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GEM STAMP CO. (Dept. M5)

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How many stamps have you of this Old Town on the Adriatic? None! Well here is your opportunity. Five fine large Frame **FREE** with any one or more of:—10 Cuba 6d., 30 Turkey 1½, 50 Colombia 2½, or with approvals. Enclose postage. Dealers supplied. Overseas agents wanted. Price list **FREE**.

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You will be delighted with the excellent value of this **FREE PACKET**, and it will be sent to **YOU**, **ABSOLUTELY FREE**, if you ask to see our World-famous Big Discount Approvals, and enclose 2½d. for postage.

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A HAPPY EVENT FOR YOU, the day you join my Approval Service, personal attention (the choice of the wise collector) and a super introductory gift. Write now. **J. O. BROOKS, WELFORD, RUGBY**

For other Stamp Advertisements see also pages 232 and 233

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

ONE cannot wonder that governments, even rich ones like that of Uncle Sam, look to postage stamps to provide a nice little slice of profit, when figures are available showing just how many stamp collectors buy. For instance, during 1948 the U.S.A. Philatelic Section sold stamps to the value of \$4,136,122, and since the inception of the office in question they have unloaded stamps worth the fantastic sum of \$34 million.

In the meantime the U.S.A. continue to turn out new stamps that also rake in precious dollars, which goes to show what a poor job our own post office is doing in that line, for figures have been published which prove that our own special issues have not been very popular. But collectors would be well advised not to overlook the British commemorative stamps which have been issued recently, for though somewhat in the doldrums at the moment, they are bound to come into their own one day.

One of the stamp magazines remarked recently how popular Australian stamps are. As a matter of fact, all Dominion stamps are enjoying a boom, but if there are any readers who are really interested in philately, as distinct from ordinary stamp collecting, the current set of South Africa should give them by far the most fun, for never, in the writer's opinion, has a set been issued since stamps first appeared



that presents more scope for study. Every possible philatelic variety is to be found in this set. It has been crumbing for some years now and a lot of work on it has been done already, for there are a number of first-class philatelists in South Africa, as their magazine, "The South African Philatelist" testifies. But there is still plenty to be done before this wonderful set has yielded all its philatelic secrets.

Not everybody has time or inclination to go in for deep studies. Those who have not will get all the fun they want by collecting Australian stamps, or Canadian, or New Zealand, which accounts for the popularity of these Dominion issues. The great advantage that these stamps have in these days of short spending money is that if one is content to collect them used, apart from the early issues, a wonderful show can be got together for a very small sum.

Some time ago a collector of Canada, who claimed that he had not spent more than £3, over several years at that, won a substantial prize in a competition open to all, and collections that had cost many times as much were replaced. Part of all the collector had taken pains



to learn all about the stamps he was collecting, and this was evident by the way his stamps were arranged. Then he had only been interested in taking copies in their finest condition. The result was admirable, and it is a great pity that such a collection couldn't have been seen by scores of collectors. Many of



these think that any old stamps will do, and that after a spot of football or gardening it's no much trouble to wash one's hands, so not comes the album, and while one's hands are cleaner after lingering for the pages, the pages themselves are not. Such collections will never win prizes, or give their owners any real pleasure for that matter.

By the time these lines are being read the new issue for Sudan should be on sale, and collectors old and new will miss that old set with the striding camel. In these days of new issues, it seems incredible that a design can have been in use for over 50 years, but it is so, for as long ago as 1st March 1948 the stamp illustrated was issued to commemorate the "Camel" set, which first appeared in 1898. Another curiosity about this set was that after more than 40 years it was discovered not by an Arab but by an American, that the Arabic inscription was wrong. So the inscription was altered and another lot of stamps came out, but in the same design. It is these that at long last end their honourable career.

Dealers report that the new periodicals of Ceylon are not selling well. The probable reason is that they do not bear the King's head. It is a fact well known to dealers that stamps with the King's head thereon do sell much better, and for this reason, the new set of Sarawak is not only in big demand, but earlier issues of the same country are now enjoying a flip, so if you fancy Sarawak, and apparently many do, now is the time to fill your blanks. They are certainly attractive, as the illustrations of some of them in the March "M.M." show.

And now a final illustration, this time a stamp to arouse the envy of those thematic collectors who collect stamps that depict something outstanding. What could be grander in the way of heroic ornaments than the wonderful beard shown on the stamp shown here, taken from a Portuguese Indies set?

We saw a very laughable collecting gathered on these lines the other day, and it is really amazing what designs one can find on stamps. The collection started with a copy of the first stamp issued by St. Kitts-Nevis—it had only cost 6d., and this showed Columbus, or Colon, as his countrymen call him, sighting land with a telescope, an instrument that was not invented until at least a century after Columbus had sailed. And there were lots more stamps like that. Why not look up a few?



From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

THE HOSPICE OF ST. BERNARD, SWITZERLAND

This famous hospice, which must be one of the highest habitations in Europe, stands 8,000 ft. above sea level on the Swiss-Italian border. The St. Bernard after whom it is named came from this part of the

regions of far away Tibet. One priest was killed some time ago when on this mission. Another brother immediately took his place, although he knew only too well the full hazards and dangers of his journey and mission.

E. EMEYS JONES (Pembroke).



The monastery and hospice of St. Bernard, at the summit of the famous Alpine pass. Photograph by E. Emeys Jones, Penmaenrhos, Old Colwyn.

world. There was a hospice in the Pass as early as the 9th century. St. Bernard refounded it in the 11th century, and this started a movement which has saved the lives of countless travellers who had to traverse the snowbound Pass of St. Bernard. Napoleon brought an army along this unfamiliar way on one occasion.

The famous St. Bernard dogs are housed under perfect conditions. Each has its own cot, electric light and clean straw on the floor. Visitors to the hospice can see the dogs and cubicles on payment of one shilling. One of the Brothers takes the dogs for their daily exercise every day at 10 a.m. and 6 p.m. Puppies can be bought on the spot—but they cost about £100 each!

The building on the right-hand side houses the chapel, museum and general stores, as well as other offices. On the left-hand side is the hostel proper. The kennels are also in the building on the left-hand side.

The journey from the lowland to the heights of the hospice is a real test for any car driver, as it is made on a tortuous winding mountain road. Swiss drivers skilfully manipulate the large luxurious motor cars which make a daily trip from Martigny to St. Bernard.

The lay brothers who run the hospice have sent missionaries to the even more mountainous

THE CHINA CLAY INDUSTRY

The discovery of china clay in Cornwall was made by William Cookworthy of Knaresborough in 1755. Before this date all china clay had to be imported from China and the East. Now there is a large area of workings to the north and west of St. Austell.

The first step in the removal of the china clay, or kaolin, is to blast large cracks in the working face. When the charges have been fired, water is sprayed into the cracks to wash down the clay into tanks at the bottom of the clay pit. This raw clay is mixed up with quartz which has to be removed. In the tanks the impurities are allowed to settle to the bottom leaving the pure clay mixed with water on top. The liquid is pumped into large settling tanks, where the water is allowed to evaporate, leaving the clay in a solid form.

Next the clay is baked in a kiln and before it sets hard is broken by a mechanical rake into suitable sizes for transport. Meanwhile the impurities have been loaded into skips, taken up to the tops of the giant dumps, rising to 200 or 300 ft., in ships running on rails, and there is tipped.

The pumping duties are now largely handled by electric pumps, but a few beam engines are still working.

The making of china is not the only use of china clay; it is also employed in making such things as paper and chemicals. It also plays a part in the making of face powders and tooth paste, and in a very refined form it is used as a base for some medicines.

R. W. M. COOPER (St. Austell).



The hills of residues left after the extraction of china clay in Cornwall. Photograph by R. W. M. Cooper, St. Austell.

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

A Knight's Tour Puzzle

Most readers will know the knight's move in chess, two ahead or to one side followed by one to the side or ahead. This move is the basis of our first competition this month.

The accompanying diagram represents the 64 squares of a chess board, distorted a little to make it convenient for printing. In each "square" is a word, and the 64 words together make up a paragraph from an article in this issue of the "M.M." The paragraph is not reproduced exactly, however, one or two words having been missed out or changed.

All that is necessary in this puzzle is to find a starting place, and then from this square to proceed by the knight's move, selecting in each case the one out of the possible moves that seems to give the best sense. This process is to be continued until the entire passage of 64 words has been worked out. This must then be written on a postcard or a sheet of paper, and the entry must also give the name of the article containing the original paragraph and its page number.

Entries must be forwarded to "May Knight's Tour Contest, Meccano Magazine, Binns Road, Liverpool 15." There are two sections, for Home and Overseas readers respectively, and in each there will be prizes of 21/-, 15/- and 10/6 for the best

difficult	I	to	am	often	of	size	street
use	I	more	years	cables	nor	is	study
engineer	than	have	to	other	I	the	what
likely	and	five	am	never	describe	and	which
actually	an	yet	these	able	jobs	jointer	in
where	to	now	after	joined	tell	laid	ten
as	joining	I	must	of	cables	cables	the
but	they	work	the	could	be	years	together

entries in order of merit. If there is a tie for any prize the judges will take neatness and novelty into consideration, and in addition there will be Consolation Prizes for other entries that just fail to win one of the principal awards.

Entrants must remember to put their names and addresses on their efforts before posting. The closing date in the Home Section of the contest is 30th June. That in the Overseas Section is 29th September.

Can You Trace These?

Do you read advertisements? This is perhaps an unnecessary question for readers, who find the advertisements in the "M.M." a splendid store of information on things in which they are interested and will therefore be greatly attracted by a competition based on them.

In this novel contest 10 clues are given, and each points directly to a particular advertisement in this issue. In some cases the clues will show immediately the nature of the advertisement concerned, but in others a little more thought will be necessary to establish a connection.

Here are the clues: 1, It issues a bulletin, but nobody is ill; 2, Used over and over again; 3, A shocking affair; 4, Time you had it; 5, To be three-cornered is to be a special attraction; 6, Designs in colour seen here; 7, Half a thou is the number; 8, One runs three times as far as two; 9, Must be well rubbed in; 10, More are coloured than plain.

In their entries competitors must state which four or five items are referred to in each clue, together with the names of the advertisements concerned and the page numbers. Entries should be addressed "May Advertisement Contest, Meccano Magazine, Binns Road, Liverpool 15."

As usual, there will be two sections, for Home and

Overseas readers respectively. In each of these prizes of 21/-, 15/- and 10/6 will be awarded for the best three entries in order of merit, and there will be Consolation Prizes for other good efforts. If necessary the judges will take novelty and neatness into account in making their decisions. Closing dates: Home Section, 30th June; Overseas Section, 29th September.

May Photographic Contest

The fifth of our 1950 series of photographic contests is a general one, in which we invite readers to send in prints of any subject. There are only two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents.

The competition will be in two sections, A for readers aged 16 and over, and B for those under 16. Each competitor must state in which section his photograph is entered. There will be separate Overseas Sections.

In each section prizes of 21/-, 15/- and 10/6 will be awarded. Entries should be addressed: "May Photographic Contest, Meccano Magazine, Binns Road, Liverpool 15." Closing dates: Home Section, 31st May; Overseas Section, 31st August.

Fighting Forest Fires—(Continued from page 221)

not spark up into flames again. Smouldering tree stumps have to be covered with earth or sand to put them completely out. During periods of acute danger in hot spells special patrols of foresters sometimes have to be maintained where conifer plantations border on railway lines, for the sparks from engines may easily set fires of forest ablaze.

The Forestry Commission, State guardian and extender of our national forests, plays its part by vigilantly watching for fire outbreaks all through the year, by constant experiment as to the best methods of defence, and by planting trees with wide lanes and rides between their stands to allow fire tenders to move close in. But it is still up to every owner of the public to be careful with what is after all our own property. That 5,498 acres of Scottish forest could be destroyed in a single month, as they were recently, shows that the need for care is still great.

"Box-Kite" to "Brahazon"

(Continued from page 196)

were joined by the "Beaufort" torpedo carrier and minelayer, which was built in Britain and Australia.

Its heavier counterpart, the "Beaumont," first Bristol type to use the powerful new "Hercules" sleeve-valve engine, was developed just in time to deal with the Luftwaffe's night blitz on London. In their first two months of action, with the aid of early forms of radar search equipment, "Beaumont" squadrons destroyed more than 29 German raiders. A few months later, when the Germans abandoned the night blitz, the "Beaumont" turned to the offensive, first attacking shipping in Western waters and then supporting Allied Armies in the Western Desert and the Far East, where they earned the name "Whispering Death" from the Japanese.

All these aircraft had Bristol engines. So had thousands of warplanes built by other firms, for the products of the Aero Engine Division powered every class of British front-line aircraft from fighters to heavy bombers. Altogether 101,200 Bristol engines went into war service, including over 57,000 "Hercules."

Nor did the end of the war bring any sudden switch in the company's activities. Development of the "Buckingham" bomber and its derivative the "Buckmaster" trainer was stopped, but production of the new "Brigand" continued, first as a torpedo-fighter replacement for the "Beaufighter," then as a light bomber, and, stripped of its armament, as a meteorological aircraft.

Emphasis had begun to shift, however, from military to civil types, and before 1945 was out the first Bristol civil project, the highly-practical "Freighter," was in the air. Its outstanding success on the Berlin Air Lift and in passenger and cargo operations throughout the world is too familiar to need recalling here. It has since been joined by the well-known Type 731 "Scaphandre" helicopter and the giant "Brahazon I," the world's biggest air liner.

The Engine Division too has recorded many post-war achievements. While continuing production of the "Hercules" and the new 2,500 h.p. "Centaurus" piston engines for both military and civil use, it has produced several outstanding project engines, starting with the 2,000 h.p. "Thecus," first aero engine ever to complete a 500-hr. endurance test, and leading up to the 3,500 h.p. "Proteus." This type will power Britain's 100-passenger transatlantic "Brahazon 2" landplane and "Princess" flying boat air liners.

In so brief a record many famous Bristol products

have inevitably been overlooked, for 174 aircraft types have been produced by the company since the 1914 "Bullet," quite apart from a long series of famous engines. Every one of these types contributed something to the experience of the company, enabling it to face with enthusiasm and confidence each new problem as it arose.

Using the Meccano Gears Outfit "A"

(Continued from page 223)

The design that the model produces may be varied by moving the position of Strip 9 or the Fishplate 8. Further variety is obtainable by bolting two Reversed



"Green Goddess," No. 1 of the 15 in. gauge Romney, Hythe and Dymchurch Railway, looks massive beside these "small scale" locomotive men. Peter Neale (aged 41) and his brother Kenneth (aged 21) admire the highly-polished appearance of this well-known engine.

Angle Brackets 14 to the Semi-Circular Plate and lock setting Bolt 15. This arrangement is shown in Fig. 1. Either of the 4" Sprocket Wheels can be replaced by a 2" Sprocket and this also produces a change in the design.

Parts required to build the Meccanograph: 4 of No. 1; 8 of No. 2; 2 of No. 3; 7 of No. 5; 4 of No. 10; 2 of No. 11; 8 of No. 12; 1 of No. 13b; 2 of No. 16; 1 of No. 17; 1 of No. 18a; 1 of No. 19b; 1 of No. 19c; 3 of No. 22; 1 of No. 23; 1 of No. 24; 1 of No. 25; 70 of No. 37; 8 of No. 37a; 8 of No. 38; 1 of No. 44; 1 of No. 48; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 90a; 5 of No. 111c; 2 of No. 125; 2 of No. 189; 2 of No. 190; 2 of No. 191; 2 of No. 192; 1 of No. 213; 1 of No. 214; Meccano Gears Outfit "A."

Planning Ahead with Hornby-Dublo

(Continued from page 231)

start on the slope with four crutches by careful work on the regulator handle—sorry, Controller!—to avoid all wheel spin.

A further word about gradients: to prevent vehicles encountering the changes of gradient must be gradual. If you can spare further floor space, the easier the gradients are the more realistic is the appearance, but certainly the capabilities of Dublo locomotives needn't worry you.

Once the layout has attained a high level track you have scope for all kinds of civil engineering. The Meccano shed girder bridge on our system is but one example. Viaducts made of wood or cardboard with printed "brick paper" or embankments of green "art felt" can help. We hope to erect a further station at high level with, perhaps, its sidings and turntable.

Fireside Fun

"That fishing port must be a healthy place to live in."

"Why?"

"Well, they can cure herrings there when they are dead."



"Where are you going?"

"Back again."

"I wonder what kind of noises an American locomotive hears."

"Don't be silly. They can't hear anything."

"But they must do. They have engineers on them."

Host: "And now, Lady Brown, as our honored guest, perhaps you will be good enough to sit on my right hand."

Lady Brown: "Thank you, but I would rather sit on a chair."

"Yes, all these boys and girls can beat us old slagers in one thing."

"I don't think they are so clever. What can they do that we can't, I would like to know."

"They can grow."

The famous painter was curious about one of the drawings of a pavement artist.

"What's that supposed to be?" he asked.

"It's a dromedary, sir."

"H'm, it's clear that you never saw a dromedary, my man."

"Well, sir, some of those R.A. chaps have painted angels, haven't they?"



"Why didn't you keep up with the others?"

"What—and leave the horse?"

BRAIN TEASERS A MILD ACROSTIC

In this there are eight "lights," and the clues to them are as follows: 1. Warning sound; 2. Established Englishman's rights; 3. Food now; can become even more food if not eaten; 4. Privately is in it; 5. Spanish port; 6. South African native weapon; 7. Bright advertising light; 8. Dish made from 3.

The "uprights," that is the words formed vertically by the initial and final letters of the light, name something obtained on the first of each month.

A.J.H.

CAN THIS BE DONE?

At a small exhibition extending over three days the takings were respectively £3/11/-, £4/9/6 and £8/11/-. The same admission fee was charged each day. What was it, and how many visitors were there on each of the three days?

S.W.C.

FILM TITLES WANTED

The following letters form a glorious jumble: a, a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z. But when put in order they make up the titles of three well-known films. What are these?

M.V.



"Is my back tyre flat, Willie?"

"Only a little bit at the bottom."

A CRICKET PUZZLE

In the first few matches of the cricket season Smith and Brown had taken 18 and 8 wickets respectively and had equal bowling averages. Then came a match in which Smith took one wicket for 25 runs and Brown six wickets for 66 runs. This made Smith's average 9 and Brown's 9.8, although the latter did best in this game. How many runs had previously been scored against Smith's and Brown's bowling?

SOLUTIONS TO LAST MONTH'S PUZZLES

The six well-known towns muddled in our last competition last month were: DUNFERMLINE, OXFORD, LIVERPOOL, NORWICH, NEWPORT and OLDHAM.

The missing words in our second puzzle were: POINT, TRAIN, COACH, STATION and SIGNAL.

The smallest number divisible by each of the digits from 1 to 9 is 2,520.

Our fourth puzzle was a catch. The solution is ALPHABET.

To make 508 with eight fours add 444, 44, 4, 4, and 4.

Be in the
examiner's
good
books



There's nothing like bold, clear handwriting for making a good impression on an examiner! A Blackbird pen not only has a 14-ct. gold nib that writes quickly and clearly but the whole pen is constructed to stand up to long, hard wear. It's at a price you can afford too! In black, green, blue or grey. Price 14/8 (incl. tax)

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